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LOCAL ECONOMIC FACTORS AFFECTING NAVY FIRST-TERM REENLISTMENT

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The effects of local economic factors on an individual's decision to reenlist or extend were investigated for a cohort of four year obligors who enlisted between April and September 1974 using probit maximum likelihood estimation. The attractiveness of the civilian labor market both at an individual's home town and at his duty station was represented by measures of local unemployment and relative wages. Additionally, Navy reenlistment incentives and demographic

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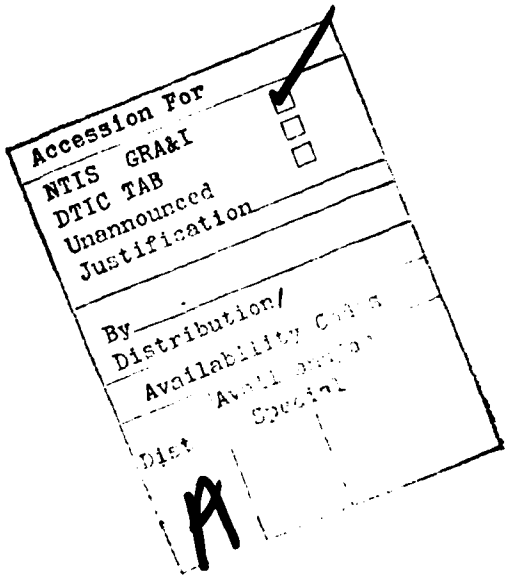
characteristics of the individual were investigated. Results indicated that, for some mechanical and administrative ratings, unemployment at an individual's home town at approximately the time of first assignment to a permanent duty station had a positive influence on the likelihood of remaining beyond the completion of a first term. Relationships between local labor market conditions and reenlistment behavior were generally weaker than the relationships observed between national economic conditions and reenlistment in previous studies. Promotion and reenlistment bonuses were shown to have a strong positive impact on the retention of all occupational groups.



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EXECUTIVE SUMMARY

An analysis of the effects of local economic conditions on Navy first-term reenlistment behavior was conducted by Information Spectrum, Inc. (ISI) under contract with the Systems Analysis Division of the Office of the Chief of Naval Operations (OP-96).

Using a sample of four year obligors who enlisted between April and October 1974, a model was constructed for reenlistment and extension behavior in three occupational groups which were defined by ISI and for six occupational subgroups. Local economic variables included home town and duty station unemployment and wages. Other model variables included socioeconomic information for each individual, the individuals pay grade, and the reenlistment bonus award level for his or her occupation. Probit maximum likelihood estimation was used to estimate the equations.

The results of the investigation reinforced a previously observed relationship between home town unemployment at approximately the time of first assignment to duty station and the likelihood of reenlisting or extending for individuals in the administrative and mechanical ratings. High home town unemployment at this early time was associated with a higher likelihood of remaining in the Navy beyond the end of the first term. The impacts of home town unemployment, both at the time of first assignment to duty station and the time of reenlistment, were generally

smaller than the impact of national unemployment observed in previous ISI time series work. Duty station unemployment and both home town and duty station relative wages, at approximately the time of reenlistment, were not found to be influential.

Although the relative wage variables did not appear to play a large part in the decision to remain in the Navy, other measures of compensation, (promotions and reenlistment bonuses) were quite influential for all groups tested. As would be expected, those in higher pay grades were much more likely to be retained. For example, other things being equal, an E-5 has a higher propensity to reenlist by about 25% than an E-4. Bonuses also had a large positive impact on retention. The reported effects of bonuses are likely to have been understated since bonuses were offered to ratings where the underlying propensity to reenlist was lower than was desired by the Navy.

Socioeconomic factors were consistently found to influence reenlistment behavior. Women and blacks were more likely to reenlist or extend, which may be a further indication that the relative difficulty of finding a civilian job may be an important part of the reenlistment decision. High school dropouts had higher propensities to remain in the Navy than would be expected given their other characteristics. Married people, who may place a greater

value on job security, were more likely to reenlist or extend than single people. High mental ability was associated with a greater likelihood of remaining, which may indicate that success experienced in the Navy is an important consideration

Because of limitations imposed by the available data, the influence of extended deployments on reenlistment behavior was masked by other effects and could not be adequately assessed. Respecification of the model to permit isolation of this effect is recommended. Also, the dramatic influence of pay grade on reenlistment behavior suggests that the addition of new variables bearing on promotion opportunity would be fruitful.

The fact that the demographic, economic, and policy variables, which were found to be influential in this study are also significant in studies bearing on recruiting and retention suggests that a comprehensive model covering all three phenomena (recruiting, attrition, and retention) would be useful in defining manpower management strategy for first term personnel. The ability to apply accession and training costs in such a model would permit the development of optimum (least cost) strategies for the recruiting, counter-attrition, and retention programs. Development of such a comprehensive model is recommended.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

In order to manage its supply of manpower, the Navy has long been interested in economic and demographic factors which influence reenlistment. Compensation and recruiting policy and perhaps occupational channeling can be designed to take influential reenlistment factors into account, e.g., pay, bonuses, unemployment, marital status, and mental ability. If, for example, reenlistment is found to depend on pay and bonuses then the Navy would want to consider these effects when formulating compensation policy. Similarly, if mental ability is found to influence reenlistment then this effect could be taken into account during preenlistment screening; if individuals who are more likely to reenlist are selected, then reenlistment will be higher. In addition, recruits who are more likely to reenlist might be channelled into occupations which require more training; in this way the Navy would receive a longer pay back period on its training investment. Finally, knowledge of factors that influence reenlistment can be used to predict reenlistment rates. As a predictive device, reenlistment models can be used to help anticipate the supply of manpower.

This report of a cross sectional reenlistment study has all of the above applications. The study is a continuation of and a major advance over previous reenlistment research conducted by Information Spectrum, Inc. (ISI). It uses a data base composed of individuals (disaggregate data). This allows greater precision in testing effects. Additionally, the probit maximum

likelihood methods described below will yield results which are free of problems encountered in the former studies. Before discussing the model or the methodology in detail, however, a brief comparison of literature related to this work highlights the new features which this study embodies.

A. RELATED STUDIES

Since the All Volunteer Armed Force came into existence, many studies concerning the supply of military manpower have been conducted. Of an early group of studies done for the President's Commission on an All Volunteer Armed Force, the analysis by Gary Nelson is particularly close to previous ISI work (others are listed in the bibliography).1/ Unlike ISI's work, Nelson's model does not include controls for unemployment. Also, unlike ISI's work, he finds that military and civilian wage variables have a strong influence on reenlistment. The differing results may be due to an omitted variable bias in Nelson's model (unemployment), to differences between Navy and Army reenlistment behavior, or to any number of less apparent possibilities. Like previous ISI work, Nelson uses aggregate data. This study uses disaggregate data to test the influence of both earnings and economic conditions.

1/ Gary R. Nelson "Economic Analysis of First-Term Reenlistments in the Army," Studies Prepared for the Presidents Commission on an All-Volunteer Armed Force, Vol. 1, (Washington, DC: U.S. Government Printing Office, 1970), Part II, Study 6.

More recent work using disaggregate data and logit maximum likelihood estimation has been done by Wayne Perry.[2] He used a sample questionnaire completed by Air Force avionics technicians which included information regarding the intention to reenlist, expected military and civilian pay, and other economic factors, e.g., unemployment. While Perry's disaggregate data and demographic variables and methodology are similar to this study, there are important differences. First, he models the intention to reenlist as opposed to actual reenlistment. Second, as noted above, he has no control for economic conditions in the civilian sector, e.g., unemployment rate or growth in employment.

Previous analysis by ISI makes use of time series data which, in general, limit sample size and engender other methodological problems.[3] With reservations about sample size and autocorrelation, these studies find first-term reenlistment rates responsive to unemployment and bonuses. No relationship is found between relative wages and first-term reenlistment.

The previous ISI study has controls for economic conditions, but this study is an advance in this regard. The new

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[2] Wayne D. Perry, "First-Term Reenlistment Intentions of Avionics Technicians: A Quantitative Analysis," (Report R-2152-ARPA, Rand Corp., October 1977).

[3] Diane Reedy and Les Cohen, "The Sensitivity of First-Term Navy Reenlistment to Changes in Unemployment and Relative Wages," (Report No. V07855-02, Information Spectrum, Inc., October 13, 1978); and Les Cohen and Diane Reedy, "The Sensitivity of Navy First-Term Reenlistment to Bonuses, Unemployment and Relative Wages," (Extension of Report No. V-7855-02, Information Spectrum, Inc., January 9, 1979).

disaggregate data includes geographic data, i.e., duty station and home town factors. With this information relevant civilian labor markets with their economic variables can be matched with each individual. In this manner the effects of earnings and economic conditions on reenlistment can be tested with greater precision.

This study attempted to combine the best features of previous studies and includes the completely new geographic information. Advantages of this study include:

- o A large body of disaggregate data.
- o Information regarding military pay, reenlistment bonuses, demographic characteristics, preenlistment residence, and duty station.
- o The utilization of probit maximum likelihood estimation as the analytical tool.

B. A MODEL OF FIRST-TERM REENLISTMENT

The first-term reenlistment decision is likely to develop continuously throughout the first term of service.[4/] As suggested in previous ISI research, the most important time in this decision process may be six to nine months after enlistment.[5/] At this point in the first term of service an individual has just completed basic training and has probably formed opinions about the Navy. If his view of the Navy is negative it will probably

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4/ Perry, "Reenlistment Intentions," p. 10-2.

5/ Reedy and Cohen, "Sensitivity of First-Term Reenlistment," pp. 14-5.

have an adverse effect on his approach to the rest of his first term. Consequently, his advancement and satisfaction with the Navy will most likely continue to be negative.

The timing of the decision process is important where economic factors are involved. After initial training, an individual often returns to his home town where he may assess his career alternatives in the civilian sector. His home town civilian earnings and employment alternatives may appear inferior to those in the Navy. Individuals whose home town economies are depressed early in their first term may find the Navy to be an attractive career. Alternatively, individuals whose home town economies are expanding may lose interest in the Navy and be unlikely to reenlist.

The individual's reenlistment decision may also be influenced by civilian employment opportunities at his duty station. While many Navy personnel spend much of their time away from their duty station, the duty station economy may still be an important source of information about alternative career opportunities. The economic conditions at an individual's duty station may influence his decision later in his first term with home town influence being greater earlier.

In comparing the Navy with the civilian sector on an economic basis, the individual considers his relative earnings. Hence, his military compensation should be important in the reenlistment decision. This compensation includes his base pay, various forms of compensation in kind, and fringe benefits such as housing,

commissary privileges, and Navy Exchange discounts. Reenlistment bonuses are also offered depending on the individual's rating at reenlistment time.

Economic forces may come into play in less direct ways than relative earnings and employment opportunities. For example, individuals who are married may value job security and be more likely to reenlist. Blacks and women may face economic discrimination in the civilian sector and be more likely to reenlist. These demographic factors may, however, be related to reenlistment in other ways. Navy life may make marriages more difficult and consequently reenlistment less likely. If blacks and women feel discriminated against in the Navy, they may be less likely to reenlist.

Other demographic factors which may be related to reenlistment are mental ability and education. Individuals with higher mental ability and education should generally have both higher military and civilian pay and occupational opportunities. For a given Navy rating (e.g., AW, AE, ADJ), reenlistment may be negatively related to mental ability and education, particularly for individuals whose Navy occupation does not adequately challenge their mental ability and education. For those individuals one would expect the likelihood of reenlistment to fall as alternative civilian opportunities rise in number and quality.

One level of education may have a special impact on the likelihood of reenlistment. Individuals who complete high school may be more goal oriented and more likely to continue in the Navy

on a career basis. Individuals who drop out of high school may lack the perseverance to succeed in any careers; military or civilian.6/

Other aspects of job satisfaction, which have little to do with economic and demographic matters, are likely to affect reenlistment. Some individuals find Navy discipline and life in general agreeable, while others do not. While these factors may be important, economic and demographic factors seem likely to have their own influence. It is these latter factors with which this study is concerned.

6/ Sheldon E. Haber, "Factors Influencing Attrition in the Marine Corps," (Technical Paper Serial T-306, Program in Logistics, The George Washington University, March 4, 1975), p. 34-6; and Claycombe, "The Supply of Young Craftsmen," (Forthcoming Technical Paper, Program in Logistics, The George Washington University), Chapter V.

II. METHODOLOGY

Discussion of the model in the previous section suggests that reenlistment behavior is a function of job availability, characteristics of the individual, and Navy policy variables. These factors were formulated into the following empirical equation:

REENLIST = f (HOME UNEMP, Δ HOME UNEMP, HOME RWAGE, DUTY UNEMP, Δ DUTY UNEMP, DUTY RWAGE, SEX, RACE, MARITAL STAT, EDUCATION, AGE, AFQT GROUP, AWARD LEVEL, PAYGRADE)

Definition of these variables is given in Table 1, and data sources are detailed in the following section.

A. DATA SOURCES; DATA SYNTHESIS

The primary data base for this equation is a cohort file supplied by the Defense Manpower Data Center (DMDC). This and other data sources are described more fully in Appendix C. The cohort file is composed of Navy reenlistment eligibles who enlisted between April and October, 1974. It includes their home town and duty station zip codes, demographic characteristics, rating, paygrade, and reenlistment bonuses for those who reenlisted. Reenlistment bonus award levels for those who did not reenlist were added to these data based on the April 1978 award levels for the appropriate Navy Enlisted Classification (NEC) or rating. With these cohort data and the supplemental information described below, each individual has been assigned a value for each of the equation variables.

TABLE 1

REENLISTMENT EQUATION VARIABLES

VARIABLE NAME	DEFINITION	DATA SOURCES
REENLIST	=1 If individual reenlists or extends =0 Otherwise	D.M.D.C. Cohort File
	ECONOMIC DATA	
HOME UNEMP	Local Aggregate Unemployment Rate	Local Area Unemployment Statistics (BLS)
ΔHOME UNEMP	$\frac{(\text{Unemployment}_t - \text{Unemployment}_{t-1})}{\text{Unemployment}_t}$	Local Area Unemployment Statistics (BLS)
HOME RWAGE	$\frac{(\text{Basic Pay + BAQ + Subsistence})}{(\text{Home Wage}) \times 4}$	Defense Manpower Requirements for FY-78 Employment and Earnings by Industry (BLS)
DUTY UNEMP	Local Aggregate Unemployment Rate	Local Area Unemployment Statistics (BLS)
ΔDUTY UNEMP	$\frac{(\text{Unemployment}_t - \text{Unemployment}_{t-1})}{\text{Unemployment}_t}$	Local Area Unemployment Statistics (BLS)
DUTY RWAGE	$\frac{(\text{Basic Pay + BAQ + Subsistence})}{(\text{Duty sta. wage}) \times 4}$	Defense Manpower Requirements for FY-78 Employment and Earnings by Industry (BLS)

TABLE 1 (Continued)

REENLISTMENT EQUATION VARIABLES

VARIABLE NAME	DEFINITION	DATA SOURCES
	DEMOGRAPHICS	
SEX	=1 If female =0 If male	D.M.D.C. Cohort File
RACE	=1 If black =0 Otherwise	D.M.D.C. Cohort File
MARITAL STATUS	=1 If married =0 Otherwise	D.M.D.C. Cohort File
H.S. GRADUATE	=1 If high school diploma graduate =0 Otherwise	D.M.D.C. Cohort File
AGE AT ENTRY		
AGE: 17	=1 If entered the Navy at age 17 =0 Otherwise	D.M.D.C. Cohort File
AGE: 21	=1 If entered the Navy at age 21 or older =0 Otherwise	
AFQT GROUP:		
AFQT: I	=1 If in Mental Group I =0 Otherwise	D.M.D.C. Cohort File
AFQT: II	=1 If in Mental Group II =0 Otherwise	
AFQT: IIIL	=1 If in Mental Group IIIL =0 Otherwise	
AFQT: IV	=1 If in Mental Group IV =0 Otherwise	

TABLE 1 (Continued)

REENLISTMENT EQUATION VARIABLES

VARIABLE NAME	DEFINITION	DATA SOURCES
	NAVY POLICY	
AWARD	Number of months pay an individual would be eligible to receive as a reenlistment bonus	D.M.D.C. Cohort File Op. 01
PAYGRADE:		
E-3	=1 If paygrade was E-3 =0 Otherwise	D.M.D.C. Cohort File
E-5	=1 If paygrade was E-5 =0 Otherwise	

Both the attractiveness of Navy pay relative to that offered in civilian jobs and the difficulty of finding employment in the civilian job market were thought to be important determinants of the reenlistment decision. Local earnings and unemployment data were obtained from the Bureau of Labor Statistics (BLS).

A relative wage was defined as follows:

$$\text{RWAGE} = \frac{(\text{Basic Pay} + \text{Basic Allowance for Quarters (BAQ)} + \text{Subsistence})}{(\text{Local Weekly Wage in Manufacturing}) \times 4}$$

Relative wages were calculated both for an individual's home town and for his duty station. Wage in manufacturing was used as a measure of civilian compensation because it was felt that of available local wage information, this wage best represented the alternative civilian wage for the overall mix of Navy enlisted skills. The use of more occupationally specific wages was made difficult by the frequent ambiguity in defining an appropriate civilian counterpart for a Navy occupation. Further, it was felt that the more relevant local wages to a specific occupation would be highly correlated with the wage in manufacturing, both wages typically following a given local economic cycle. It should be noted, however, that the current methodology for testing relative wage effects is imprecise.

Local unemployment data for the years 1975 through the first half of 1978 were obtained from the Bureau of Labor Statistics. Annual unemployment rates were calculated for each Standard Metropolitan Statistical Area (SMSA), county, and state. Home town unemployment data for 1975 through 1978 were attached as follows.

If the hometown zip code indicated that the individual resided in an SMSA, then SMSA unemployment was attached to his record; otherwise, the figure for his county of origin was used. If both SMSA and county data were unavailable, then statewide averages were substituted. Duty station unemployment was similarly attached to each record. However, those with zip codes for the forces afloat (09501 and 96601) were not assigned duty station economic conditions and were written to a separate file. Only the effects of home town economic conditions were tested for these individuals because of the difficulty of defining a relevant duty station local economy.

In order to more fully describe an area's economy, the change in unemployment variable was included to complement the unemployment variable. Individual behavior may be different if local unemployment is rapidly rising (or falling) as opposed to being relatively stable. The change in unemployment variable was entered as:

$$\Delta \text{UNEMP} = \frac{\text{UNEMP}_t - \text{UNEMP}_{t-1}}{\text{UNEMP}_t}$$

where:

UNEMP = Local home or duty station unemployment rate.

t = Time in years.

As noted in the discussion of the model, the importance of economic conditions at the home town and duty station was expected to differ throughout the first term. Therefore, data were created and coded on each record for each year from 1975 to 1978. With this information the postulated timing was checked.

B. MAXIMUM LIKELIHOOD ESTIMATION

The dichotomous dependent variable in this model creates some methodological problems. Maximum likelihood estimation of a probit transformation was used to deal with these difficulties. The most important problem is that ordinary least squares (OLS) estimation is inherently heteroscedastic when the dependent variable is dichotomous. If the variance of the error term is a function of the dependent variable then the significance of independent variables cannot be determined. Another drawback is that, with OLS, the prediction of the model may fall outside the zero-one range required of a probability. The model predicts the probability of an individual reenlisting; the methodology should yield only values between zero and one.

Maximum likelihood estimation yields consistent and asymtotically efficient estimates even when the dependent variable is dichotomous. This solves the heteroscedasticity problem. The probit and logit transformations constrain the prediction of the model to the value of a probability; the zero-one range. Maximum likelihood estimation of these transformations has all of the desirable estimation properties, i.e., consistent and asymtotically efficient estimates and a prediction that can be interpreted as a probability.

Briefly, but more explicitly, maximum likelihood estimation can be used to test for significance because the likelihood function in the form defined below requires only that the sample observations be independent. OLS requires that the variance of

the error term be independent of the dependent variable, which it is not with a dichotomous dependent variable.

The probit transformation constrains the prediction of the model by mapping it into the normal cumulative density function via the following expressions:

$$p(y=1|x) = \frac{1}{\sqrt{2\Pi}} \int_{-\infty}^{\alpha+\beta x} e^{-\varepsilon^2/2} d\varepsilon$$

and $p(y=0|x) = 1 - p(1)$

For a more detailed discussion refer to Appendices A and B.

C. PROCEDURE

With the constructed data base, preliminary cross tabulations were made and OLS equations were estimated before the final probit experiments were conducted. This section deals with these preliminary steps and with the limitations imposed by the data.

1. Data Limitations

It is important that the nature of the limitations imposed by the available data be understood and that their influence on the results of the study be appreciated. In order to comply with privacy act requirements, social security account numbers were removed from the DMDC tape so that individuals for whom data was supplied could not subsequently be identified. This precaution made it difficult to obtain

supplementary data on individuals for the data base during the course of the study. As a consequence, the analysis had to proceed within the limitations imposed by the data as originally requested from DMDC. The nature of these limitations is described below.

a. Inclusion of Personnel on Extension of Enlistment

In constructing the data base, the reenlistment eligible population was defined by taking the original 1974 entry cohort and examining its status as of 30 September 1978. Six year obligors (6Y0), deserters (as determined by DOD separation code 00), and persons separated more than ninety days prior to expiration of enlistment were later removed from the sample. In the remaining group of 15,721 persons, the fact of non-reenlistment was determined by the existence of a valid DOD separation code. The remaining population was presumed to have continued on active duty subsequent to 1 October 1978.

The difficulty with the above procedure is that the population remaining after 1 October 1978 includes personnel on extension of enlistment. Extensions of enlistment of up to two years are not counted as reenlistments. Thus, the files, as structured, cannot be used to define reenlistment rate for the initial entry cohort. On the other hand, if the obvious strategy of eliminating persons on extension was adopted, results would be distorted, since personnel on extension who subsequently reenlisted would be lost. It would appear that a willingness to

execute an extension indicates a higher than normal propensity to reenlist. An alternative would have been to define the data base at a later point in time when extensions had been converted to either reenlistments or separations. The difficulty with this approach is that it was not feasible to accommodate the full two years required (Sept 30, 1980), so that significant numbers of personnel on extension would have remained in any case. Another argument against this approach was that second term attrition would be very difficult to account for and would undoubtedly have introduced some inaccuracies into the data base.

After consideration of the alternatives described above and a number of possible variations, it was concluded that the best and least ambiguous approach was to remain with the original data base. Therefore results discussed below deal with the likelihood that personnel will either reenlist or extend at the end of their first enlistment.

b. Distinction Between Personnel Stationed Ashore and in Forces Afloat at Time of Expiration of Enlistment

As was mentioned in Section A, the index used to cross reference DMDC data and BLS and Census data was zip code. Zip codes attached to personnel assigned to forces afloat were those for the Fleet Post Offices in New York and San Francisco. Since duty station economic conditions for personnel stationed in the forces afloat, based on the San Francisco and New York Areas (SMSAs), would have been largely irrelevant, it was decided to

structure the analysis to deal separately with personnel assigned afloat and ashore, with duty station local economic data attached only to personnel stationed ashore. Each rating group studied is thus partitioned into an afloat and an ashore segment with a separate analysis for each segment.

It was expected that the characteristics of the afloat and ashore segments of the various rating groups would differ. In the first place, the vast majority of female personnel are necessarily ashore. (There are some women in shore based aviation units assigned to the forces afloat). The concentration of women in the ashore segment of the population tends to enrich that population with respect to high school graduates, since women must meet higher educational standards to enlist.

A more important phenomenon, tending to change the composition of the afloat and ashore components of a rating group, is the practice of transferring personnel ashore prior to a deployment if their enlistment will expire while deployed and they decline to reenlist or extend. This has the effect of transferring certain losses to the shore component while enriching the afloat component with potential reenlistees. This effect is apparent for all rating groups, resulting in the calculation of a significantly higher propensity to reenlist or extend for personnel assigned to the forces afloat.

Within the context of these limitations, analysis of the data proceeded in the manner described below.

2. Cross Tabulations

Before proceeding with the probit analysis cross tabulations and ordinary least squares equations were calculated. The purpose of these steps was twofold: first, to obtain preliminary information regarding the nature of the effects of the model variables on reenlistment so that they could be accurately coded; and second, to establish functional occupational groups displaying similar reenlistment behavior with respect to those variables.

As explained in the introduction, hypotheses regarding the effects of many of the demographic variables on reenlistment behavior were not clearly established by economic theory. Often, two opposing forces could be thought to be acting on an individual's reenlistment decision given a certain characteristic, one favoring reenlistment (for example, the importance of job security for a married individual), the other making reenlistment less likely (the effect of possible family separation on that same individual). In an attempt to best define and code such demographic variables, preliminary reenlistment tabulations were made.

a. Race, Sex, Ability, and Education

Reenlistment rates by race, sex, marital status, and education for the total cohort file are presented in Table 2. In addition to providing information concerning the way in which these factors are associated with the likelihood of reenlisting,

or extending these actual figures can be later used to test the validity of the probit model's predicted results.

TABLE 2

SAMPLE REENLISTMENT RATES

	MARRIED		SINGLE	
	H.S. GRAD	H.S. DROPOUT	H.S. GRAD	H.S. DROPOUT
BLACK:				
FEMALE	.61	--	.64	--
MALE	.60	.58	.45	.51
NON BLACK:				
FEMALE	.54	--	.42	--
MALE	.54	.48	.42	.37

b. Mental Ability

The model hypothesized that mental ability is related to reenlistment. The DMDC tape contains the Armed Forces Qualification Test (AFQT) percentile for each individual. To test whether this variable was monotonically related to reenlistment, the AFQT percentile was broken into mental group categories. Reenlistment rates (controlling for paygrade) were determined and plotted (Figure 1). A strong monotonic relationship was apparent for E-5's: as ability rises, the likelihood of remaining in the Navy rises. However, this pattern was not repeated for the E-4's or for the total cohort. In the E-4 group, both the above average and below average individuals were more likely to remain in the Navy than those of average ability,. Because of this nonlinearity it was decided that ability level should be coded as a series of dummy variables representing AFQT mental group.

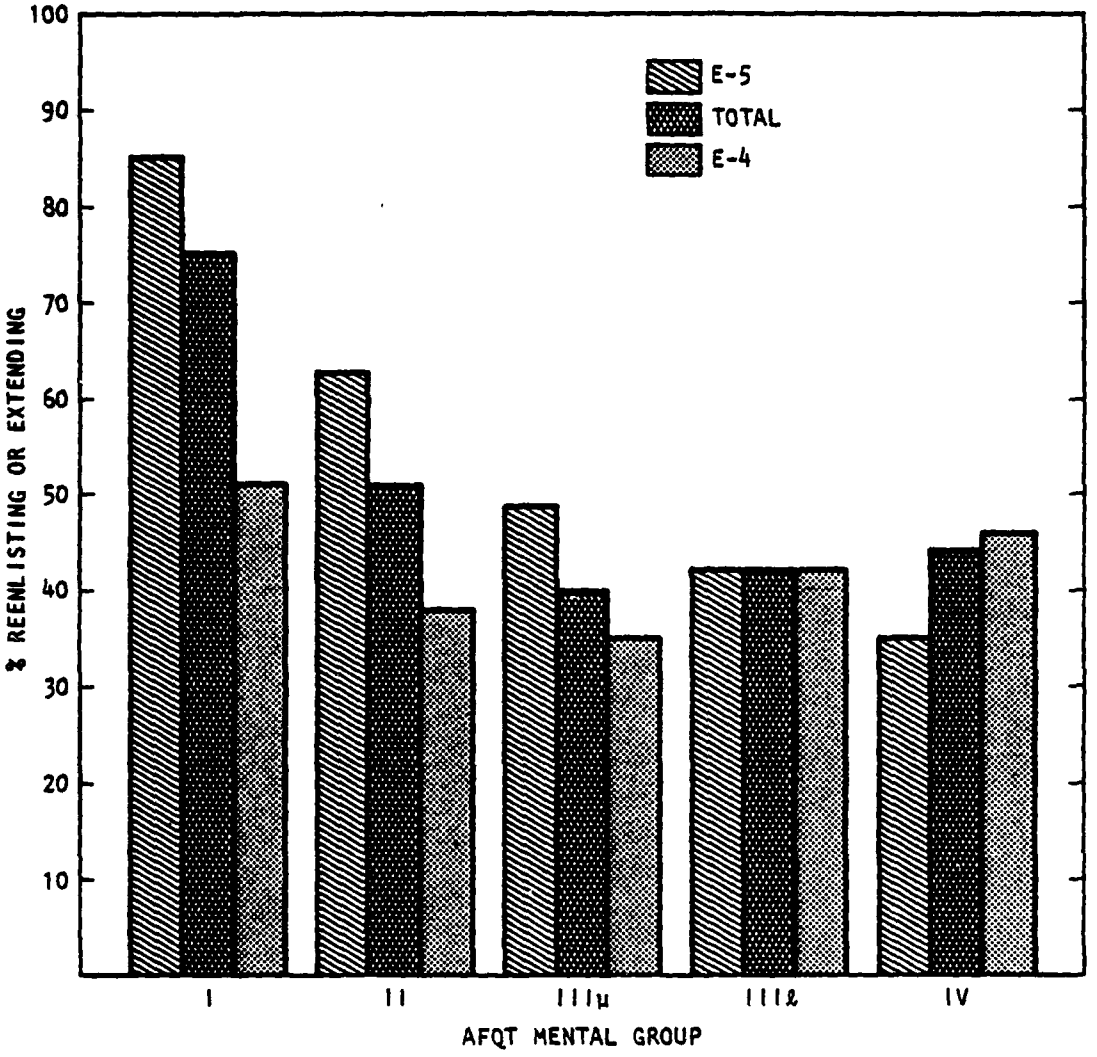

FIGURE 1

Reenlistment or Extension Rate by Mental Group
For Pay Grades E-4, E-5, and Total

It was noted that this reenlistment pattern is a continuation of a general trend in attrition by mental group for this 1974 cohort (Figure 2)[7]. Those with somewhat above average ability (Mental Group II) are also substantially more likely to complete their first term than those of average ability[8].

3. Occupational Groups and OLS Equations

The cohort file was partitioned by three occupational Groups: administrative ratings, high technology ratings, and mechanical ratings. As mentioned previously, those Groups were broken into afloat and ashore categories. Ordinary least squares equations were estimated based on samples of the total cohort and of each of these subfiles. The results are listed in Appendix D.

To test the homogeneity of the three major groups, subgroups of ratings were formed based on similarities of working conditions and job duties.[9] (See Tables 3 through 5 for listings of ratings within each subgroup). Means of equation variables and OLS equations were estimated for ashore subgroups with at least 250 members (Results are listed in Appendix D).

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[7] Data on mental ability for 1974 entry cohort was obtained from Martin, J.C., "A Geographic Analysis of the Demographic Characteristics of Navy Enlistments: 1971-1978". (Information Spectrum, V-7986-02), 1979, p. 13.

[8] See also, Lockman, R.F., Success Chances of Recruits Entering the Navy. (Center for Naval Analyses, CNS 1086), 1977, pp. 8-16.

[9] Atwood, H.C. Jr., Navy Career Guide 1977-78.

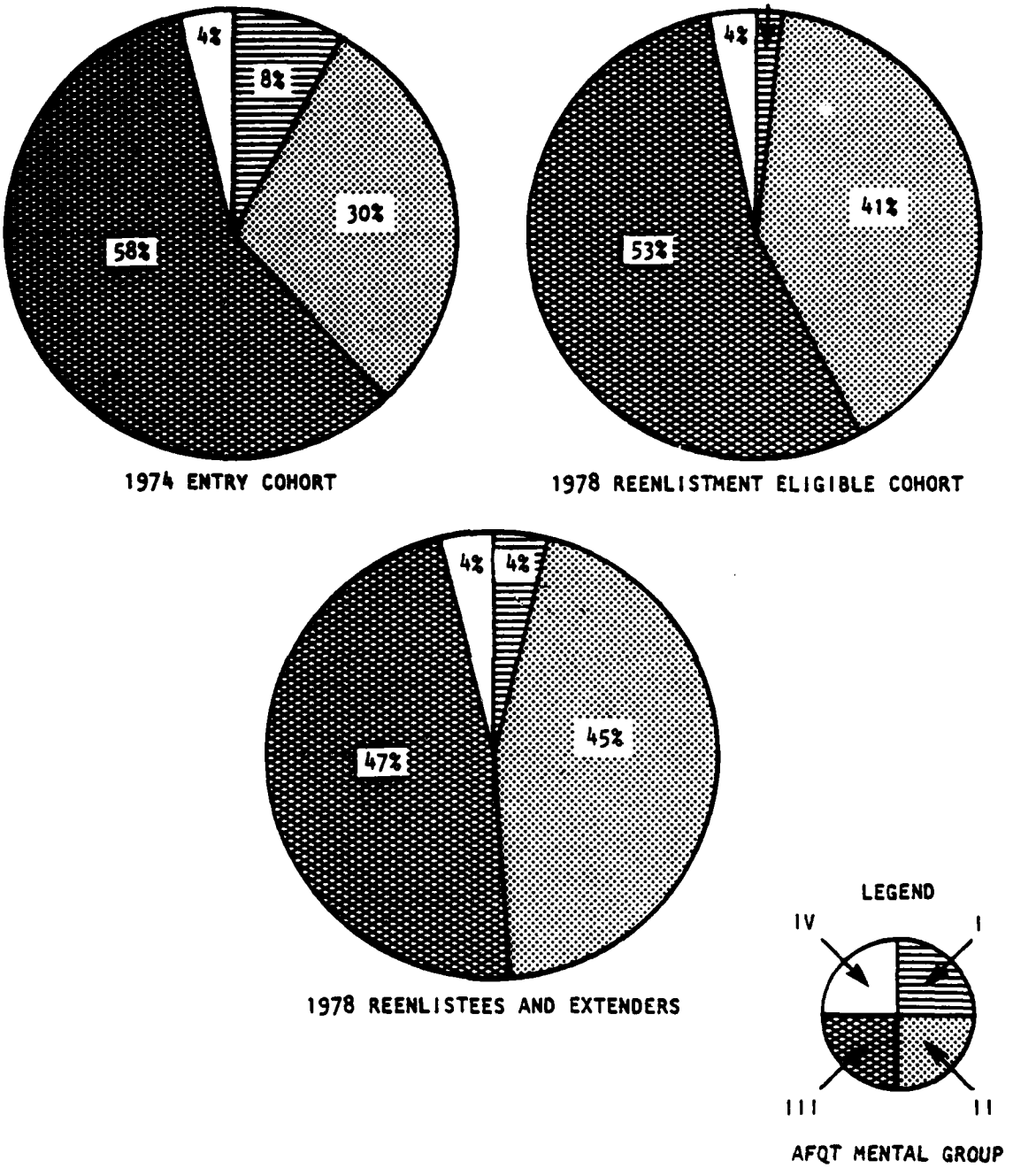

FIGURE 2

Mental Group Distribution of 1974 Entry Cohort vs. Mental Group Distribution of 1978 Reenlistment Eligibles and those who Remain Beyond the End of their First Term

TABLE 3
ADMINISTRATIVE RATING GROUP
OCCUPATIONAL SUBGROUPS AND RATING COMPONENTS

	AFLOAT	ASHORE
I. CLERICAL AND ADMINISTRATIVE		
A. Clerical YN - Yeoman PN - Personnelman LN - Legalman	273	351
B. Storekeepers AK - Aviation Storekeeper SK - Storekeeper SH - Ship's Serviceman	485	262
C. Clerks PC - Postal Clerk DK - Disbursing Clerk	101	68
II. HEALTH DT - Dental Technician HM - Hospital Corpsman	83	841
III. OTHER AZ - Aviation Maintenance Administrativeman DM - Illustrator-Draftsman JO - Journalist LI - Lithographer MS - Mess Management Specialist MU - Musician	508	318
TOTAL	1450	1840

TABLE 4
MECHANICAL RATING'S GROUP
OCCUPATIONAL SUBGROUPS AND RATINGS COMPONENTS

	AFLOAT	ASHORE
I. DECK	645	275
AB - Aviation Boatswain's Mate BM - Boatswain's Mate		
II. METAL WORKERS	860	472
SW - Steelworker HT - Hull Maintenance Technician AM - Aviation Structural Mechanic		
III. ENGINE	1282	726
AD - Aviation Machinist's Mate EN - Engineman CM - Construction Mechanic MM - Machinist't Mate		
IV. BOILER	508	168
BT - Boiler Technician UT - Utilitiesman		
V. CONSTRUCTION	209	133
BU - Builder CE - Contruction Electrician EA - Engineering Aid EO - Equipment Operator		
IV. OTHER	1163	779
AC - Air Traffic Controller AO - Aviation Ordnanceman AS - Aviation Support Equipment Technician ML - Molder MR - Machinery Repairman PM - Patternmaker PR - Aircrew Survival Equipmentman		
TOTAL	4667	2553

TABLE 5
HIGH TECHNOLOGY RATINGS GROUP
OCCUPATIONAL SUBGROUPS AND RATINGS COMPONENTS

	AFLOAT	ASHORE
I. WEAPONS TECHNICIAN	587	223
TM - Torpedoman's Mate MN - Mineman MT - Missle Technician GM - Gunner's Mate		
I. RADIO	593	429
RM - Radioman		
III. SONAR AND ELECTRONICS	833	710
A. SONAR		
ST - Sonar Technician OT - Ocean Systems Technician CT - Cryptographic Technician AW - Aviation Antisubmarine Warfare Operator		
B. ELECTRONICS TECHNICIAN		
AT - Aviation Electronics Technician ET - Electronic Technician AX - Aviation Antisubmarine Warfare Technician		
IV. RADAR TECHNICIAN	435	169
OS - Operations Specialist FT - Fire Control Technician EW - Electronic Warefare Technician AQ - Aviation Fire Control Technician		
V. ELECTRICIANS	755	381
AE - Aviation Electrician's Mate ET - Electrician's Mate IC - Interior Communications Electrician		
VI. ADP	121	136
DP - Data Processing Technician DS - Data Systems Technician TD - Trademan		
VII. OTHER	26	41
AG - Aerographer's Mate		
TOTAL	3350	1907

These results indicate that with one there is a great deal of variation in both the characteristics of individuals in each subgroup and in the factors influencing reenlistment.[10] Unfortunately, the sample size of many of these subgroups was too small for probit analysis to be performed; therefore, the analysis in the following section deals mainly with the three major rating groups: administrative, mechanical, and high technology. Probit estimates also were made for all subgroups containing at least 700 members, and these results are very useful in showing the components of the overall behavior.

4. Probit Equations

Probit maximum likelihood estimates of the beta coefficients, the standard errors, and the means of variables are listed in Appendix E for the following occupational groups and subgroups.

TOTAL ADMINISTRATIVE:	ASHORE
CLERICAL:	ASHORE
HEALTH:	ASHORE
TOTAL ADMINISTRATIVE:	AFLOAT
CLERICAL:	AFLOAT
TOTAL MECHANICAL:	ASHORE
ENGINE:	ASHORE

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[10] The sonar subgroup and the electronics subgroup had very similar sample characteristics and reenlistment behavior. For this reason, these two subgroups were combined. With somewhat less justification, the clerical and administrative subgroups (having both similar job responsibilities and similar types of people filling these jobs) were combined.

TOTAL MECHANICAL:	AFLOAT
ENGINE:	AFLOAT
METAL WORKERS:	AFLOAT
TOTAL HIGH TECHNOLOGY:	ASHORE
SONAR & ELECTRONICS:	ASHORE
TOTAL HIGH TECHNOLOGY:	AFLOAT
ELECTRICAL:	AFLOAT
SONAR & ELECTRONICS:	AFLOAT

The following section presents these results in the form of conditional probabilities. As is emphasized in Appendix A, the contribution of any one variable to the probability of reenlisting is dependent on the values taken on by the other variables in the equation. Most of the probabilities presented in Section III have been evaluated by holding all variables, except for the one in question, constant at the occupational group mean. These probabilities reflect the propensity to reenlist or extend for persons with one specific characteristic (i.e., females) and with all other characteristics identical to the average. Thus, the information reflects the contribution of a single variable to the propensity to remain in the Navy. To get a more accurate picture of how persons with a certain characteristic could be expected to behave (since all other factors do not take on the values of the sample mean), subpopulation averages were calculated within the occupational groups (Appendix E) and conditional probabilities were calculated which more accurately reflect actual behavior of a subpopulation. The following analysis will address both sets of probabilities.

III. ANALYSIS OF RESULTS

A. INTRODUCTION

The results obtained through the methodology and procedure described in the previous section of this report fall into three categories. First, the analysis has established a series of demographic subpopulations in the enlisted population. There are marked differences in the propensity to reenlist or extend among these subpopulations, many of which may be related to the difficulty of finding civilian employment. Second, the influence of local economic conditions on reenlistment behavior is examined in the analysis. Finally, there are several variables reflecting Navy personnel management policy - promotion and bonuses - which are influential in determining reenlistment behavior. The subsections that follow provide a detailed analysis of results in each of these areas.

B. DEMOGRAPHIC VARIABLES

Characteristics of the individuals which were investigated were age, race, sex, marital status, ability, and education. Women, blacks, and high school dropouts were more likely to reenlist, indicating that the relative difficulty of finding a civilian job may be an important part of the decision to remain in the Navy. On the other hand, those with more mental ability were more likely to reenlist or extend than those with less ability, possibly indicating that success experienced in the Navy is an important consideration. These variables were consistently important among the occupational groups, with some differences in the magnitude of these effects.

1. Sex

Within an occupational group, women were more likely to reenlist or extend than men. Table 6, which was calculated from the regression equations by holding all other variables constant at their mean value and setting the sex dummy to 1, gives an indication of the magnitude of the effect of this factor.[11] Propensity to reenlist or extend for women was generally higher for all occupational groups whether stationed afloat or ashore.

TABLE 6

PREDICTED PROBABILITIES OF REMAINING IN THE NAVY - MALE VS. FEMALE

	MALE	FEMALE
Mechanical	.41	.51
Administrative	.42	.50
High Technology[12]	.61	.57

This higher likelihood of reenlisting or extending may be based on a number of underlying factors including self selection at enlistment time, civilian labor market discrimination, and Navy policy toward women. The predominant reason for female behavior at reenlistment time may be screening and self selection at the time of recruitment. In 1974, when the women in this sample entered the Navy, female enlistment was tightly constrained by

[11] Because male ashore reenlistment and extension rates would appear depressed relative to female ashore rates (see Section II: Data Limitations), Table 3 represents a weighted average of the predicted ashore and afloat components of each occupational group.

[12] Women in high technology ratings were concentrated in the Radioman (RM) rating where reenlistment & extension rates were much lower than in other high technology ratings.

quotas.[13] Hence, many of these women may have had to wait for months to enter under the Delayed Entry Program. Women who enlist under these circumstances are likely to have stronger motivations for joining the Navy than would men and would therefore, be more likely to stay.

Civilian labor market discrimination may be another factor related to female retention. In the Navy, women may have more occupational choices available to them than they would as civilians, and yet they would be less likely to be assigned to arduous duty than Navy men. Women's advancement (and therefore, pay) in the Navy was similar to that of men.[14] In contrast, civilian women receive slightly less pay than men when performing in equal jobs.[15] A more important problem for civilian women is that similarly qualified men and women do not get the same jobs. Education, training, and experience have less payoff in terms of salary for civilian women.[16] For these reasons

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13/ Conversation with Mr. Henry Lipsie. Navy Recruiting Command. July 1979.

14/ Correlations between sex = female and paygrade: ashore ratings groups.

	Mechanical	Administrative	High Technology
E-3	.18	.06	-.07
E-5	-.03	.07	.07

15/ Sell, R.R. and M.P. Johnson, "Income and Occupational Differences Between Men and Women in the United States." Sociology and Social Research. October, 1977. p.4.

16/ Ibid, p.g. See also: Bridges, WS.P. and R.A. Beck, "Sex, Earnings, and the Nature of Wrok: A Job Level Analysis of Male-Female Income Differences." Social Science Quarterly March, 1978. p. 560.

current relative wages (Navy/Civilian) were higher for women than for men, and expected future wages may also be higher in the Navy.

2. Race

Blacks were much more likely to reenlist than whites and other groups. This results was interesting, especially in light of the fact that minorities are not less likely to attrite during the first term.[17] As indicated in Table 7, the predicted difference in reenlistment rate, holding all other variables constant at the mean, ranged from one to twenty-four percent. The difference was particularly pronounced for the high technology occupations. This phenomenon may reflect the quality of employment opportunities in the civilian sector for blacks. Blacks experience levels of unemployment which are twice the national average.[18] Therefore, those who are completing their first term of enlistment may find entry into the job market rather difficult. Additionally, high skill craft unions may practice discrimination in allowing blacks to enter.[19] This

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17/ Lockman, Robert Jr,. Success Chances of Recruits Entering the Navy (SCREEN)., p. 14. Lockman finds no significant difference between the behavior of Caucasians and Non-caucasians. The difference in results of this reenlistment study and Lockman's attrition study may be due in part to an increased sense of accomplishment at the end of their first term.

18/ Betsey, Charles L., "Differences in Unemployment Experience Between Blacks and Whites,." American Economic Review: Papers and Proceedings, May 1978, p. 192.

19/ Ashenfelter, O. "Racial Discrimination and Trade Unionism." Journal of Political Economics, May 1972, p 444. See also, Leigh, D.E., "Racial Discrimination and Labor Unions." Journal of Human Resources Fall 1978, pp. 568-77.

TABLE 7

ESTIMATED PROBABILITY OF REMAINING
- BLACKS vs. WHITES AND OTHER

	BLACK	NONBLACK	DIFFERENCE
MECHANICAL: ASHORE	.37	.25	.12
ENGINE	.45	.27	.18
MECHANICAL: AFLOAT	.56	.48	.08
ENGINE	.63	.56	.07
METAL WORKERS	.60	.53	.07[1/]
ADMINISTRATIVE: ASHORE	.47	.41	.06
CLERICAL	.42	.41	.01[1/]
HEALTH	.51	.42	.09[1/]
ADMINISTRATIVE: AFLOAT	.56	.46	.10
CLERICAL	.56	.48	.08
HIGH TECHNOLOGY: ASHORE	.56	.39	.17
SONAR & ELECTRONICS	.74	.50	.24
HIGH TECHNOLOGY: AFLOAT	.77	.64	.13
SONAR & ELECTRONICS	.91	.79	.12
ELECTRICIANS	.68	.54	.14

1/ Race was not significant.

may account for the very high propensity of blacks in the high technology ratings to remain in the Navy.20/

3. Marital Status

Table 8 shows the expected difference in the probability of remaining in the Navy for married and single individuals holding all other factors constant. Married people were more likely to reenlist or extend for all of the groups tested. Such a result may indicate a desire on a married person's part for the job security which is offered by the Navy and is likely also to reflect the importance of Navy medical benefits and Commissary and exchange privileges to a person's family.

20/ Another explanation of black reenlistment behavior has been suggested by Richard Booth ("Social Status and Minority Recruit Performance in the Navy". Sociological Quarterly, Autumn 1977.) In a study of Navy paramedic retention, he postulated an association between minority retention and job expectations.

> ... Individuals who are of low status outside of the organization in question have relatively low expectations of their work situations.... In relative routine jobs, the expectations of low status employees are realistic. In the case of more highly skilled and prestigious positions, their expectations will be surpassed. In either case, the congruence of their expectations and the actualities of the job will be better than that of individuals who come from higher status backgrounds. The latter group may anticipate deriving more prestige out of their work than the jobs actually afford.

TABLE 8

ESTIMATED PROBABILITY OF REMAINING
- MARITAL STATUS

	SINGLE	MARRIED
MECHANICAL: ASHORE	.23	.30
ENGINE	.26	.30[1/]
MECHANICAL: AFLOAT	.46	.55
ENGINE	.54	.63
METAL WORKERS	.48	.62
ADMINISTRATIVE: ASHORE	.38	.43
CLERICAL	.39	.44[1/]
HEALTH	.41	.41[1/]
ADMINISTRATIVE: AFLOAT	.44	.54
CLERICAL	.45	.58
HIGH TECHNOLOGY: ASHORE	.37	.46
SONAR & ELECTRONICS	.45	.60
HIGH TECHNOLOGY: AFLOAT	.61	.73
SONAR & ELECTRONICS	.75	.87
ELECTRICIANS	.50	.62

[1/] Difference was not significant.

The effect of marriage on reenlistment was most pronounced for the afloat group. The marriage variable was always significant for the afloat group and the difference between married and single probabilities of reenlisting or extending was larger than in the ashore group. This result ran somewhat counter to intuition, since sea duty would be associated with family separations, which would make married life much more difficult.

Reenlistment bonus award levels were consistently higher for the occupational mix afloat. Also individuals in the afloat groups were more likely to have been promoted to E-5. Both bonuses and promotions may be more important to the married person and to his or her family. The primary difference between the afloat and ashore populations is that there are few women in the afloat population. The ashore population contains a significant proportion of married women as well as married men. It seems reasonable to expect that those benefits salient to married people (such as medical care, housing, job security, and possibly retirement) would be of particular importance to married men.

4. Mental Ability

Preliminary tabulations indicated that high ability individuals and, to a lesser extent low ability individuals have higher reenlistment and extension rates than those of average ability. These results were substantiated by the probit estimates (See Table 9). In all occupational groups and subgroups except clerical and metal workers, being in AFQT mental groups I or II was associated with a greater likelihood of

TABLE 9

EXPECTED PROBABILITY OF REENLISTING OR EXTENDING

	I&II	IIIu	IIIl	IV
MECHANICAL: ASHORE	.27	.24	.26	.31
ENGINE	.35	.25	.18	.35
MECHANICAL: AFLOAT	.55	.47	.50	.53
ENGINE	.69	.44	.49	.45
METAL WORKERS	.56	.55	.51	.48
ADMINISTRATIVE: ASHORE	.41	.36	.43	.59
CLERICAL	.23	.32	.51	.55
HEALTH	.38	.28	.33	--
ADMINISTRATIVE: AFLOAT	.52	.46	.45	.47
CLERICAL	.47	.46	.49	.48
HIGH TECHNOLOGY: ASHORE	.40	.35	.33	.44
SONAR & ELECTRONICS	.57	.43	.52	.76
HIGH TECHNOLOGY: AFLOAT	.70	.57	.55	.54
SONAR & ELECTRONICS	.81	.72	.57	--
ELECTRICIANS	.61	.51	.41	.45

remaining in the Navy than being in mental group III upper. In most of the ashore groups, those in mental groups III lower or IV were more likely to reenlist or extend than those in mental group III upper. That mentally average people would have the lowest tendency to reenlist or extend may be due to several factors affecting both the more able and the less able. The people in the lowest mental categories are likely to have the least opportunities for skilled employment in the civilian labor market. Their advancement in the Navy has not fallen much behind the advancement of those with average ability. They may perceive that they are doing well in the Navy relative to their civilian opportunities. On the other hand, those individuals who are well above average tend to be concentrated in the more attractive Navy occupations and are likely to have experienced a more rapid than usual rate of promotion. Finally, Navy educational and training opportunities tend to be more available to higher ability personnel. All of these factors may contribute to a greater satisfaction with the Navy and to a greater likelihood of remaining for those with high ability.

5. Age

For the purposes of this analysis personnel were classified into three age groups. These were personnel who were 17 years old at time of enlistment, personnel aged 18 and 19 years old, and personnel who were 20 years old or older when they entered the Navy. These age groups correspond to 21 year olds, 22-23 year olds and over 24 years old, respectively, at

time of expiration of their first term. The distribution of personnel by age and rating group is given in Table 10 below.

TABLE 10

DISTRIBUTION OF PERSONNEL BY AGE AND RATING GROUP

	RATING GROUP		
AGE	ADMINISTRATIVE	MECHANICAL	HIGH TECHNOLOGY
17	.16	.23	.20
18-19	.57	.61	.59
20+	.27	.16	.21

In general, the results of the analysis indicate that older personnel have a higher propensity to reenlist or extend. In the administrative and mechanical rating groups personnel who were 20 years of age or older when they entered the Navy had a significantly higher propensity to reenlist or extend than the remainder of the population. For the high technology rating group the same tendencies were apparent but the results failed to achieve significance.

It seems likely that older personnel tend to remain in the Navy because they have had experience in the civilian job market prior to enlistment and therefore have a firmer basis for comparison between Navy and civilian occupations. On the other hand, younger personnel are more likely to have entered the service directly from high school. Also younger persons tend to change jobs frequently during their early years in the labor force, apparently in search of employment which is consistent with their goals and aspirations. This job search activity would typically occur during the first years in the labor force.

6. Education

To understand the reenlistment behavior of high school dropouts, one must look at some of their other characteristics. Results for the administrative and mechanical rating groups indicate that, other factors being equal, non high school graduates are significantly more likely to reenlist or extend. When other independent variables are set at the overall population mean, estimates for the probability of reenlisting or extending for non high school graduates are seven to fourteen percent greater than for high graduates[21/]. However differences between the high school graduates and non high school graduate populations tend to counteract the influence of the education variable. In fact, when important differences between the high school graduate group and the high school dropout group are taken into consideration, the predicted reenlistment behavior is very similar. For example, high school dropouts

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21/ Predicted porobabilities of reenlisting or extending obtained by setting all variabl es equal to the mean and varying only in the high school graduate variable:

Mechanical: Ashore	H.S. Grad.	.25	Non H.S. Grad.	.32
Engine	"	.26	"	.34
Mechanical: Afloat	"	.47	"	.52
Admin.: Afloat	"	.46	"	.54
Clerical	"	.43	"	.57
Sonar & Electronics	"	.52	"	.44

are likely to be younger and less mentally able, and have been very slow to advance in rank.[22] When these and other individual factors were taken into account the likelihoods of remaining in the Navy shown in Table 11 were obtained:

TABLE 11

COMPARISON OF ADJUSTED PROBABILITIES OF REMAINING HIGH SCHOOL VS. NON HIGH SCHOOL

RATING GROUPS[1]	H.S. GRAD	NON-H.S. GRAD
MECHANICAL: ASHORE	.26	.28
MECHANICAL: AFLOAT	.50	.44
ADMINISTRATIVE: AFLOAT	.47	.46

1/ Rating groups in which education variable was significant

The results of Table 11 show that there is little difference in the likelihood of reenlistment or extension between high school graduates and high school dropouts. Thus, several factors are at work in determining the behavior of high school dropouts. On the one hand, an individual who lacks a high school diploma is likely to have an extremely difficult time finding a

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22/ High school graduate subpopulation means vs. high school dropout subpopulation means: administrative ashore

	H.S. Graduate	H.S. Dropout
Female	.03	0
Black	.22	.17
Age:17	.17	.47
Age:20+	.25	.12
AFQT:I&II	.35	.14
AFQT:IIIL&IV	.28	.58
E-3	.08	.16
E-5	.31	.08

civilian job. This same individual, however, is likely to be younger than average and hence, may have had less direct experience in the civilian labor market and a greater desire to search for a job. Slow promotion in the Navy may cause a certain amount of discontentment and may also be associated with less desire on the Navy's part to retain him.

C. ECONOMIC VARIABLES

One primary objective of this study was to test the effects of local economic conditions (both at home town and at duty station) on the likelihood of remaining in the Navy. Since a reenlistment decision could be expected to form over time, home town unemployment rates for 1975 through 1978 were tested for their effects on reenlistment. Similarly, duty station unemployment was tested for 1976 through 1978.

Results indicated a relationship between home town unemployment at approximately the time of first post-training assignment and the likelihod of reenlisting or extending for those in administrative and mechanical ratings. Other measures of the attractiveness of local civilian labor markets (relative wages and unemployment later in the first term) did not appear to have an impact on an individual's reenlistment decision.

1. Home Town Economic Conditions

Home town unemployment in 1975 (six months to a year after enlistment) was influential in determining reenlistment for some of the mechanical and administrative groups. Table 12 presents the magnitude of the effect of lagged unemployment on the conditional probability of remaining in the Navy for those

groups in which the variable was significant.

TABLE 12

CONDITIONAL PROBABILITY of REENLISTING OR EXTENDING - HOME TOWN UNEMPLOYMENT (75)

UNEMPLOYMENT	6%	8%
MECHANICAL: AFLOAT	.48	.49
ENGINE: AFLOAT	.52	.56
ADMINISTRATIVE AFLOAT	.43	.47

These results indicate that there is a higher probability of remaining in the Navy for those subsets of the administrative and mechanical populations who experienced high home town unemployment shortly after enlisting. In other administrative and mechanical subgroups, the unemployment coefficients displayed a positive relationship with reenlistment but were generally not significant. The importance of unemployment early in the first term supports the conclusions of earlier studies[23/] that the reenlistment decision is largely formed early in the first term. It further gives evidence that many individuals are aware of their home town labor markets at this critical point in the decision making process, and that the availability of employment there is an important consideration.

23/ Perry, Wayne D., "First-Term Reenlistment Intentions of Avionics Technicians"; and Reedy & Cohen, "The Sensitivity of First-Term Navy Reenlistment to Changes in Unemployment and Relative Wages."

Unemployment was not a significant consideration for those individuals in the high technology ratings. Most people in these ratings are in highly skilled specialities where finding employment is relatively easy even in times when aggregate unemployment is high. In addition to the fact that high skill unemployment is generally lower than aggregate unemployment, unemployment in technical fields is less sensitive to economic downturns (or upswings). Hence, aggregate local unemployment data is likely to be less representative of the difficulty of finding a job for those in technical specialties.

Reenlistment response to home town economic conditions tended to be consistent with, yet weaker than, the response observed in previous ISI studies using national economic conditions and time series data. The timing of the impact of unemployment tended to be similar. Cohen and Reedy found national umemployment six to nine months after enlistment to have a positive influence on reenlistment for most occupational groups.24/ However, in this present study local unemployment at the end of the first term was not shown to affect the behavior of any occupational groups. In contrast, Cohen and Reedy generally found (national) unemployment at the end of the first term to have a large impact on reenlistment. It seems

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24/ Cohen, L. and Reedy, D.E., "The Sensitivity of First Term Navy Reenlistment to Changes in Unemployment and Relative Wages." p. 17.

likely that unemployment and wages would be influential at that point in time; however, home town conditions were generally not influential, and when significant the coefficients generally did not have the expected sign. Problems with the quality of the wage information (see Section II) may account for its insignificance but a further problem in testing the impact of duty station economic conditions was encountered. Only half of the sample could be assigned duty station unemployment rates and wages based on a zip code and it was only this group for whom local duty station conditions were tested. Geographic dispersion of individuals within this ashore group was rather limited. The majority of individuals were stationed in either the Norfolk or the San Diego areas. Low reenlistment associated with high unemployment, due to some factor not measured in the model in just one of these two areas, would have had a large impact on the outcome of the probit runs.

D. POLICY VARIABLES

The values of two of the independent variables examined in this study are determined primarily by Navy policy decisions. Therefore, their influence on the propensity to reenlist or extend is of particular interest. These variables are pay grade, which is largely the results of enlisted advancement policies, and reenlistment bonus level, which is directly aimed at improving reenlistment rates. Both of these variables were influential in determining the likelihood of reenlisting or extending. Each is discussed in detail below.

1. Pay Grade

With remarkable uniformity across all rating groups, higher pay grades were more likely to reenlist or extend. In the administrative and mechanical rating groups the likelihood that a person in pay grade E-5 would reenlist or extend is about 25% higher than for a person in pay grade E-4. In the High technology rating group the increase is approximately 35%. In general, the incremental increase in the likelihood of reenlisting or extending between any two pay grades (E-3 to E-4 or E-4 to E-5) is about ten percentage points, except in the case of the high technology group where the increase between E-4 and E-5 is about fifteen percentage points. Table 13 shows the values for the conditional probability of reenlisting or extending for the ashore and afloat components of the three rating groups.

The dramatic differences between pay grades, shown in Table 13, may be due to the increase in compensation with increasing pay grade. It seems possible that the success implied by promotion as well as the increase in pay would increase the likelihood of remaining in the Navy. Personnel who have been successful in competing for promotion are more likely to have a favorable opinion of the Navy and, hence, would be more likely to reenlist. At the same time the Navy may show more interest in retaining personnel who have achieved success as measured by promotion.

TABLE 13

CONDITIONAL PROBABILITY OF REENLISTING OR EXTENDING
DUE TO PAYGRADE[1]

BY GRADE (% OF POPULATION)		RATING GROUP: ADMINISTRATIVE	MECHANICAL	HIGH TECHNOLOGY
E3 (12)	ASHORE	.1761	.1920	.1563
	AFLOAT	.3685	.3505	.4542
E4 (51)	ASHORE	.3670	.2417	.3696
	AFLOAT	.4718	.4603	.5719
E5 (37)	ASHORE	.5354	.3749	.4372
	AFLOAT	.4982	.5440	.7662

[1] Monthly pay associated with each pay grade.
E-3 - Single $720.43 Married 764.83
E-4 - Single $783.73 Married 837.43
E-5 - Single $814.33 Married 875.83

2. Reenlistment Bonus

Reenlistment bonuses award level was significant and positively related to the likelihood of remaining in the Navy for all rating groups except for the ashore component of the mechanical group. The interpretation of the magnitude of the effects of reenlistment bonuses is made difficult because the methodology which is employed is necessarily not only comparing reenlistment rates with respect to reenlistment bonuses but also with respect to occupation, since all people in a particular rating who reenlisted received the same bonus award. A second related difficulty in interpreting bonus coefficients stems from the fact that reenlistment bonuses are designed to increase reenlistment in a particular critical rating group. Whether bonus effects are overstated or understated is difficult to determine. If a large bonus was given to a particular rating, one reason may be that retaining individuals in that group was particularly difficult. This analysis may then be comparing the reenlistment rates in occupations where an underlying propensity to reenlist was very high (those occupations associated with no bonuses or low awards) with those in occupations where an underlying propensity to reenlist was very low (those occupations for which one receives a very large bonus). To the extent that this is true, the observed positive effects of bonuses on reenlistments will be understated. On the other hand, to the extent that bonuses are correlated with other effective reenlistment policy (i.e., reenlistment counseling and promotions), the effects of bonuses will be overstated.

Of the major rating groups, the observed bonus impact was largest in the administrative rating group although average bonus levels were generally higher in the mechanical and high technology groups. The overall influence of a change of one month's pay in the award level ranged from about a two percentage point increase in reenlistment for the mechanical group to between five and six percentage points for the administrative group.

In interpreting the impact of bonuses on administrative group behavior, it is important to note that the only rating in this group for which any bonus was paid was the Mess Management Specialist rating. Hence, results are not only showing the impact of bonus on reenlistment but also the impact of being a Mess Management Specialist on reenlistment. In the lower grades, MS duties may be somewhat less pleasant than those of other administrative ratings (secretarial and clerical, storekeepers, and medical and dental) and so the effects of bonuses may be actually understated for this group.

The impact of reenlistment bonuses on the behavior in the mechanical groups is more difficult to measure. Very high bonuses were offered in such unpleasant occupations as Boiler Technician (BT) and Machinist's Mate (MM) where the propensity to reenlist may be quite low. Since the data does not allow comparison of, for example, BT reenlistment rates when bonus award level is six month's pay with BT reenlistment rates when bonus award level is two month's pay, the effect of bonuses on BT reenlistments cannot be measured. For the mechanical group in

general it seems reasonable to assume that the high bonuses offered in the difficult to retain occupations would lead to an understatement of the impact of bonuses.

On the other hand, all undesignated strikers were assigned to the mechanical rating group. In addition to the fact that these personnel are not eligible for a reenlistment bonus, the Navy would be likely to put much less counseling effort into retaining this part of the mechanical group. This would be associated with an overstatement of the impact of bonuses.

The net impact of these two factors on the bonus results is difficult to determine. In the occupational subgroups of engine and metal workers, where an attempt was made to control for occupational duties and working conditions, the impact of reenlistment bonuses on reenlistment was somewhat larger than for the mechanical group as a whole. Thus, it was concluded that the actual impact of bonuses on the mechanical ratings are at least as great as the probit results would indicate.

Keeping in mind the above reservations, Table 14 portrays the effects of both pay grade and reenlistment bonus level in a single display. Likelihoods of remaining in the Navy are given by pay grade for each rating group. The influence of a change in bonus level of one month's pay above and below the observed sample mean is given for the ashore component, the afloat component and for the rating group as a whole. The broad range in estimated likelihoods (.25 to .67), over rating groups and pay grades for the population as a whole, suggests that reenlistment bonuses are extremely effective in assisting the Navy to achieve its reenlistment goals.

TABLE 14

INFLUENCE OF PAYGRADE AND BONUS AWARD LEVEL
ON
CONDITIONAL PROBABILITY OF REENLISTING OR EXTENDING

		ASHORE			AFLOAT			OVERALL		
		AWARD LEVEL			AWARD LEVEL			AWARD LEVEL		
PAY GRADE	RATING GROUP	-1	SAMPLE MEAN	+1	-1	SAMPLE MEAN	+1	-1	SAMPLE MEAN	+1
E-3	ADMIN	0.16	0.18	0.20	0.29	0.37	0.45	0.25	0.30	0.36
	MECHANICAL	0.19	0.19	0.20	0.33	0.35	0.37	0.27	0.28	0.30
	HIGH TECHNOLOGY	0.15	0.16	0.16	0.40	0.45	0.51	0.33	0.37	0.41
E-4	ADMIN	0.35	0.37	0.40	0.39	0.47	0.56	0.36	0.41	0.47
	MECHANICAL	0.24	0.24	0.25	0.44	0.46	0.49	0.36	0.38	0.40
	HIGH TECHNOLOGY	0.34	0.37	0.40	0.52	0.57	0.62	0.43	0.47	0.52
E-5	ADMIN	0.50	0.54	0.57	0.42	0.50	0.58	0.47	0.52	0.57
	MECHANICAL	0.37	0.37	0.38	0.52	0.54	0.57	0.47	0.49	0.51
	HIGH TECHNOLOGY	0.40	0.44	0.47	0.73	0.77	0.81	0.60	0.64	0.67

E. SUMMARY AND CONCLUSIONS

1. Summary

In an effort to present a concise summary of the important effects observed in this analysis, Tables 15 through 17 have been prepared showing the estimated conditional probability of reenlisting or extending for population partitionings covering pay grade and all significant demographic variables. Thus, if one is interested in the conditional probability of reenlisting or extending for a black male E-4 in the upper mental groups and who is in the administrative rating group ashore, one can enter the proper table and read the appropriate probability.

A word of caution regarding the data in Tables 16 through 18 is appropriate. While the maximum likelihood estimates used to construct these tables were all significant at least at the ninety percent level, it should be recognized that the sample employed contained very small numbers of individuals for some of the extreme partitionings implied in the the tables (e.g., black women in the mechanical ratings). Therefore, the contribution, in terms of information provided by these groups in the sample, to the overall regression results was relatively low. For this reason, the estimates for these extreme groups should be treated with caution. Also it was for this reason that estimates for women afloat were not provided although the sample did contain some women in afloat assignments (Principally in Maritime Patrol (VP) and Electronic Warfare (VQ) Squadrons).

2. Conclusions

The foregoing sections have presented detailed discussions relative to each significant variable associated with

TABLE 15

ADMINISTRATIVE GROUP - ASHORE
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.58	.54	.50	.45
	MG III-IV	.57	.52	.50	.43
E4	MG I-II	.43	.38	.35	.30
	MG III-IV	.42	.37	.33	.29
E3	MG I-II	.23	.20	.17	.14
	MG III-IV	.22	.19	.16	.13

FEMALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.72	.67	.64	.59
	MG III-IV	.70	.66	.62	.57
E4	MG I-II	.57	.53	.49	.44
	MG III-IV	.56	.51	.47	.42
E3	MG I-II	.35	.31	.28	.24
	MG III-IV	.34	.29	.26	.22

TABLE 15 (Continued)

ADMINISTRATIVE GROUP - AFLOAT
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.70	.61	.61	.51
	MG III-IV	.66	.56	.56	.46
E4	MG I-II	.66	.56	.56	.46
	MG III-IV	.61	.51	.51	.41
E3	MG I-II	.54	.44	.43	.34
	MG III-IV	.49	.39	.38	.29

TABLE 16

MECHANICAL GROUP - ASHORE
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.56	.47	.42	.34
	MG III-IV	.52	.44	.39	.31
E4	MG I-II	.39	.32	.27	.21
	MG III-IV	.36	.29	.24	.18
E3	MG I-II	.32	.25	.21	.15
	MG III-IV	.29	.22	.18	.13

FEMALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.80	.74	.69	.61
	MG III-IV	.78	.71	.66	.58
E4	MG I-II	.67	.59	.54	.46
	MG III-IV	.64	.56	.51	.42
E3	MG I-II	.59	.51	.46	.37
	MG III-IV	.56	.48	.42	.34

TABLE 16 (Continued)

MECHANICAL GROUP - AFLOAT
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.75	.67	.67	.59
	MG III-IV	.67	.58	.59	.50
E4	MG I-II	.65	.56	.56	.47
	MG III-IV	.56	.47	.48	.38
E3	MG I-II	.60	.50	.51	.42
	MG III-IV	.51	.42	.42	.34

TABLE 17

HIGH TECHNOLOGY - ASHORE
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.70	.61	.52	.43
	MG III	.62	.53	.43	.34
E4	MG I-II	.61	.52	.42	.34
	MG III	.52	.43	.34	.26
E3	MG I-II	.38	.30	.22	.16
	MG III	.30	.23	.16	.11

FEMALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.84	.78	.71	.62
	MG III	.79	.71	.63	.54
E4	MG I-II	.78	.71	.62	.53
	MG III	.71	.63	.53	.45
E3	MG I-II	.58	.49	.40	.31
	MG III	.50	.40	.32	.24

TABLE 17 (Continued)

HIGH TECHNOLOGY - AFLOAT
PROBABILITY OF REENLISTING OR EXTENDING

MALE

		BLACK		WHITE	
		MARRIED	SINGLE	MARRIED	SINGLE
E5	MG I-II	.92	.83	.82	.72
	MG III	.83	.73	.72	.59
E4	MG I-II	.80	.69	.68	.55
	MG III	.70	.57	.56	.42
E3	MG I-II	.71	.58	.57	.43
	MG III	.58	.44	.43	.30

reenlistment or extension of Navy enlisted personnel. In general, it can be stated that the results show that the propensity of personnel to reenlist or extend is dominated by demographic factors and Navy policy variables with only incidental contributions evident from economic conditions in a person's home town early in the enlistment. Duty station economic conditions at the time of expirations of enlistment do not appear to be related to reenlistment behavior. The following statements summarize the major significant findings.

a. Demographic Variables

- Sex. Women have a higher propensity to reenlist or extend than men over all rating groups.
- Race. Blacks have a higher propensity to reenlist or extend than whites over all rating groups.
- Marital Status. Married personnel have a higher propensity to reenlist or extend than single personnel over all rating groups.
- Education. Other factors being equal, there was a significantly higher propensity to reenlist or extend for non high school diploma graduates.
- Age. Personnel in the administrative and mechanical rating groups who were 24 years of age or older showed a significantly higher propensity

to reenlist or extend than younger personnel. Age was not a significant variable in the high technology rating group.

- Ability (Mental Group). Personnel in higher mental groups (MGs I & II) showed a higher propensity to reenlist or extend than personnel in mental group IIIU.

b. Economic Variables

- Duty Station Economic Conditions. No significant impacts of duty station economic conditions on the likelihood of remaining in the Navy were observed. It is possible that heavy concentrations of Navy personnel in a few areas (e.g., Norfolk and San Diego), where the local economy is relatively prosperous and stable over time, prevents the observation of statistically significant effects.
- Home Town Economic Conditions. For the rating groups with lower propensity to reenlist or extend (administrative and mechanical), home town unemployment rate within the first year of enlistment was generally influential and significant. This variable was not influential with respect to the high technology rating group.

c. Policy Variables

- Pay Grade. Over all rating groups, personnel in higher pay grades showed a markedly higher propensity to reenlist or extend than did personnel in lower pay grades.
- Reenlistment Bonus. Reenlistment bonus was significant and influential. At the mean award levels existing in 1978, an increase in award level of one month's pay is estimated to produce a three to six percent improvement in propensity to reenlist or extend, depending on rating group and pay grade.

IV. RECOMMENDATIONS

A. MANAGEMENT AND POLICY IMPLICATIONS

There are a number of features of the results reported herein which appear to have important implications for the management of the Navy's inventory of first term personnel. The significant differences observed in the reenlistment/extension response of various demographic subgroups of the population can be exploited to improve overall retention and reduce the cost of maintaining the enlisted inventory. In addition, results with respect to the policy variables, pay grade, and reenlistment bonus award level, suggest that these variables can be manipulated in ways which will favorably influence retention. The following discussion identifies opportunities for management action with respect to demographics and policy variables which have the potential for either improving overall retention or reducing the cost of maintaining the enlisted inventory.

1. Demographic Variables

a. Sex and Race.

The results of the analysis clearly show that, other things being equal, women and blacks have a significantly higher propensity to reenlist or extend. These results were consistently observed throughout all occupational groups. At the same time, analysis of the data reveals that women and blacks tend to be concentrated in the administrative subgroup. Table 18 depicts the proportion of blacks and females in the three rating groups.

TABLE 18

PROPORTION OF BLACKS AND FEMALES BY RATING GROUP

RATING GROUP	BLACK	FEMALE
ADMINISTRATIVE	.170	.223
MECHANICAL	.108	.023
HIGH TECHNOLOGY	.084	.069

From Table 18 it can be seen that blacks and women are under-represented in the mechanical and high technology rating groups. Most of the Navy's critical ratings are in these groups and entry level training costs for these ratings tend to be high. Further, the relationships between being female and a decision to reenlist or extend and between being black and a decision to reenlist or extend were particularly strong for both of these groups. (See Tables 6, 7, and E-1 through E-6). It would therefore appear that achieving better representation in these rating groups for blacks and women would tend to improve retention in the critical ratings and, by reducing accession requirements, lower front end training costs.

The distribution of blacks and females shown in Table 18 is not particularly surprising. The Navy has historically had difficulty in recruiting blacks in the higher mental groups[25/] and high aptitude is a general requirement for ratings in the high technology group. At the same time, women,

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25/ Cowin, M.T., O'Connor, F.E.,Sage, L.C. and Johnson, C.R., "The Effects of Local Economic Conditions on Navy Enlistment,"Report V-8087-07, Information Spectrum, Inc., March 1980.

until recently, have been barred from the non-traditional ratings in the mechanical and high technology groups because of the statutory prohibition against service afloat. That prohibition has recently been relaxed.

The results here suggest that aggressive management initiatives to recruit blacks and women for placement in the mechanical and high technology ratings will provide significant dividends in future retention of high quality personnel in ratings which are persistently on the list of critical ratings.

b. Marital Status

The fact that married personnel have a higher propensity to reenlist or extend has important management implications. It seems evident that this may be due to the fact that personnel with dependents place higher value on the job security offered by a career in the Navy. Further, married personnel are likely to place higher value on the non salary components of real military compensation such as dependent medical care and commissary and exchange privileges. The data suggest that the Navy's historic concern for the welfare of the families of enlisted personnel is influential in the reenlistment decision. High level concern with protecting fringe benefits is not misplaced. However, fringe benefits, as now structured, may be tilted in favor of married personnel. To the extent that they have less value to single personnel, who constitute approximately sixty percent of the population, an important influence on reenlistment behavior is lost. This suggests that management initiatives to define and implement fringe benefits which are attractive to single personnel would be beneficial.

c. Age

The results show that personnel who entered the Navy at a later age have a significantly higher propensity to reenlist or extend. The Navy is currently testing the feasibility of laterally accessing skilled workers from areas with high unemployment. This approach has the potential advantage of opening a new source of accessions in older segments of the population at a time of dramatic decline in the 18-24 year old population. In fact, the approach is triply advantageous; a new source of accession is established, training costs are likely to be reduced and, as the results here indicate, retention is likely to be higher. Clearly, the concept has far-reaching implications for manpower managers.

2. Local Economic Variables

Individuals in the administrative and mechanical rating groups were influenced by their home town unemployment rates in the first year after enlistment. Fluctuations in future reenlistment rates for these groups may be anticipated based on unemployment early in the first term. This result supports previous studies which find that reenlistment decisions are often formed early in the first enlistment. Programs which promote favorable impressions of the Navy and which facilitate the process of adapting to life in the initial post-training assignment may be helpful in improving retention and in countering the effects of a strong economy.

Relative wages were not found to be a determinant of the likelihood of remaining in the Navy. However, one should not

conclude that the deterioration of compensation would not have an adverse effect on reenlistment. Local wages which were tested may not have been the appropriate alternative wages for many of the occupational subgroups. Additionally, the effects of other measures of compensation (pay grade and reenlistment bonus) were quite large for all occupational groups.

3. Policy Variables

a. Promotion Policy

The results of the analysis show that, other things being equal, personnel who have been successful in gaining promotion to higher pay grades have a significantly higher propensity to continue on active duty beyond the end of their first enlistment. This result has two important management implications:

(1) It suggests that promotion, and associated increases in pay, may be a very effective reenlistment incentive.

(2) It tends to support Navy initiatives to obtain relief from the DOD-imposed limitations on the number of personnel in the top six enlisted pay grades.

b. Reenlistment Bonuses The positive influence of reenlistment bonuses is clearly evident in the results. It seems apparent that higher bonus levels would tend to improve reenlistment behavior. Whether structural changes to reenlistment bonuses would be beneficial is difficult to assess because of the relationship between pay grade and the size of the bonus. The high technology rating group, in particular, tends to have a concentration of critical ratings where bonuses are relatively

high and in which promotion is fairly rapid. This would seem to suggest that a bonus structure which accounted for rate of promotion, compensating for slow promotion rates, would produce a more uniform reenlistment response.

B. RECOMMENDATIONS FOR FURTHER STUDY

The study of Navy reenlistment behavior has resulted in the identification of a number of questions which suggest further lines of investigation. It is felt that the most promising of these are as follows:

- Can the ambiguity created by partitioning the population into sea and shore components be resolved either by respecification of the model or definition of new variables? Careless interpretation of the results reported herein would seem to contradict the general perception on the part of manpower managers that extended periods of sea duty operate to depress reenlistments.

- Are there implications for recruiting policy contained in the results reported herein? There are similarities between the influence of demographic variables employed in this study and that of some of the variables used in a recently completed study of Navy enlistment behavior[26].

Methodological approaches which respond to each of these questions are outlined below.

26/Cowin, et al.

1. Model Respecification

It seems clear that the command to which enlisted personnel are assigned at the end of their enlistment is not necessarily representative of the environment in which perceptions of the Navy and intent to reenlist are formed. Personnel who are transferred just prior to expiration of enlistment may move between dramatically different operational environments. There are a number of ways in which the true environmental effects could be captured. A new variable identifying either months assigned to afloat units or months in deployed status could be defined and attached to each individual record. This would require reconstruction of the original DMDC files and cross reference to Navy Manpower and Personnel Management Information System (MAPMIS) files to obtain months assigned by Unit Identification Code (UIC). Afloat command deployment schedules could then be analyzed manually to obtain calendar months in which deployed, which could then be translated into months deployed for the individual's assigned period.

A second variable of interest to be added to the model would be the elapsed time since promotion. It will be recalled that pay grade is an extremely influential variable in determining reenlistment behavior. A number of studies, including this one, have adduced evidence that attitudes toward reenlistment begin to form early in the first enlistment. Does success in the Navy as evidenced by early promotion influence these attitudes? Since promotion plans are principally driven by

expected vacancies within a given rating, significant variation in time to achieve a given pay grade may be expected across ratings, with promotions in ratings with low retention tending to occur earlier. On the other hand, the results of this study would seem to suggest that significant numbers of early promotions would lead to improved retention. Thus, there well may be a self-correction phenomenon associated with low retention which would cause oscillation in retention performance. Understanding the dynamics of this phenomenon, if it exists, could have broad implications for retention efforts.

A third variable of interest would be reenlistment rate itself. It may be that local success or failure of retention efforts influences future reenlistment rates either because of variations in the quality of the retention effort or because of mutual reinforcement of attitudes toward reenlistment in the eligible population. Inclusion of a lagged variable representing local reenlistment rates would allow detection of such effects and form the basis for appropriate changes in retention strategy.

It will be observed that inclusion of the variables suggested would require a cohort-based, cross sectional approach similar to that employed in this study. New data sources would have to be accessed to augment the existing data base and consideration should be given to expanding the data base to approximately twice its present size to improve the precision of estimates for small subsets of the population (e.g., black women, black upper mental groups, women in non-traditional ratings).

2. Investigation of Recruiting and Attrition Implications of Reenlistment Behavior

A number of studies have examined enlistment behavior, other studies have looked at attrition, and still others have examined retention behavior. The phenomena being examined have many characteristics in common and many of the same variables in all three types of studies. Demographic, Economic, and policy variables have been identified which are influential in all three processes. It would appear that enough understanding of the basic underlying phenomena exists to attempt a comprehensive investigation of the complete first term enlistment process. An understanding of the influence of demographic characteristics such as age, race, sex, and mental group on recruiting, attrition and retention performance would have important implications for the way in which recruiting goals are established for the counter attrition program and for the retention program. The modeling of the three processes in the same analytic framework would also permit the development of a first term cost model which would cover the variation in accession and training costs over demographic subgroups and rating groups. This, in turn, would permit analysis directed toward developing optimum (least cost), first term manpower, personnel and training management strategies.

A cohort-based cross sectional model such as the one employed in this study would provide an effective basis for the analysis envisioned. It would only be necessary to specify appropriate models for enlistment and attrition performance

embracing the same set of independent variables. Analysis of the three phenomena for the same entering cohort would then permit identification of important influences across a complete term of enlistment and the specification of the estimated probability of attrition and retention for appropriate segments of the population. These estimates could then be used with appropriate accession and training costs to establish expected costs for significant population subgroups. Such an analysis could then become the basis for a comprehensive strategy directed toward optimizing performance across all phases of the first term manpower management process.

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APPENDIX A

THE USE OF THE PROBIT AND LOGIT TRANSFORMATIONS
IN MODELS WITH A DICHOTOMOUS DEPENDENT VARIABLE

1. The Interpretation of a Dichotomous Dependent Variable as a Probability and the Use of the Probit and Logit Transformations in Constraining the Prediction of the Model to the Value of a Probability

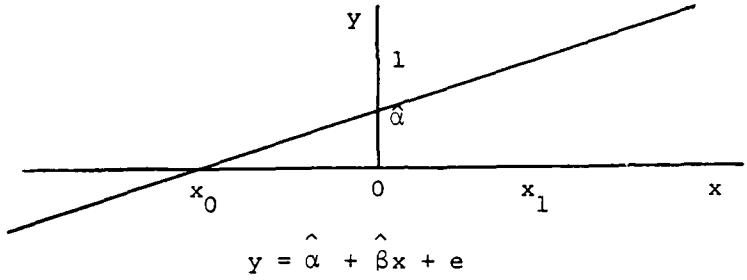


Figure 1

Suppose ordinary least squares (OLS) fits the above estimates to a set of data. The first question that arises is how are $\hat{y}$'s $\neq 1$ or 0 to be interpreted? For $0 \leq \hat{y} \leq 1$, $\hat{y}$ is interpreted as the probability (y=1/x). This interpretation breaks down in Figure 1, however, if $x_1 < x_i < x_0$, because then $1 < \hat{y}_i < 0$. Figure 1 assumes that $\hat{\beta} > 0$. If $\beta < 0$ then the above inequalities are reversed but the interpretation is still flawed. y cannot be interpreted as a probability if its value can be greater than one or less than zero.

To solve this problem the regression function must be transformed into a cumulative density function. This ensures that it takes on values between zero and one and hence can represent a probability function. Two ways of accomplishing this transformation are generally used. They are the probit and logit transformations. Both are estimated via maximum likelihood estimation where the probabilities are defined as follows.

The probit transformation uses the normal density function to constrain the prediction of the model to the value of a probability. The following transformation maps the model into the cumulative normal density function.[1/]

$$p(y=1|x) = \frac{1}{\sqrt{2\Pi}} \int_{-\infty}^{\alpha+\beta x} e^{-\varepsilon^2/2} d\varepsilon$$

$$p(y=0|x) = 1 - p(1)$$

The logit transformation uses the logistic density function to constrain the prediction of the model to the value of a probability. It uses the log-linear transformation:

$$\text{Ln}\ \frac{P(1)}{P(0)} = \alpha + \beta x$$

where

$$p(1) = P(y=1|x)$$

$$p(0) = P(y=0|x) = 1 - p(1)$$

so that

$$p(1)/p(0) = e^{\alpha+\beta x}$$

$$p(1) = (1-p(1))\ e^{\alpha+\beta x}$$

$$p(1) = e^{\alpha+\beta x}/1 + e^{\alpha+\beta x}$$

and

$$p(0) = 1 - e^{\alpha+\beta x}/1 + e^{\alpha+\beta x} = \frac{1}{1+e^{\alpha+\beta x}}$$

[1/]For further reference to both probit and logit transformations see Henri Theil, Principles of Econometrics, (New York: John Wiley & Sons, 1971), pp. 630-632.

These expressions of p(1) and p(0) as a function of $\alpha + \beta x$ are used in the likelihood function to obtain maximum likelihood estimates (MLE) of α and β.

$$L = \prod_{i=1}^{n} p(1)_i \prod_{j=n+1}^{N} p(0)_j ,$$

where observations 1 through n are ones where $y_i = 1$, and n + 1 through N are ones where $y_i = 0$. It is easier to maximize the LnL, so,

$$LnL = -\sum_{i=1}^{n} Ln(1+e^{\alpha+\beta x_i}) + \sum_{i=1}^{n} (\alpha+\beta x_i) - \sum_{j=n+1}^{N} Ln(1+e^{\alpha+\beta x_i})$$

This function is maximized via a numerical optimization program. The values $\hat{\alpha}$ and $\hat{\beta}$, which this yields, are maximum likelihood estimates and are therefore consistent and asymptotically efficient.

The result of both the probit and logit transformations is that $\hat{\alpha} + \hat{\beta}x$ is mapped into the range 0 - 1 with $p(1) = p(0) = .5$ at $x = -\hat{\alpha}/\hat{\beta}$, since $(\hat{\alpha} + \hat{\beta}(-\hat{\alpha}/\hat{\beta}) = 0)$. The curvature of the transformations differs but both can be generally depicted by Figure 2.

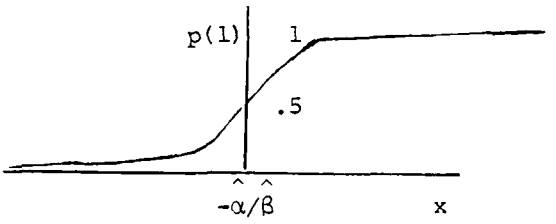


Figure 2
Probit and Logit Transformations

The shift from this univariate model to multiple regression merely involves substituting the expression XB for $\alpha + \beta x$. The predicted probability of the probit transformation is obtained by reading the probability that corresponds to XB out of a standard normal density table. The logit transformation's implicit constraint on the value of the model's predicted probability is seen by:

$$1 - p(1) = p(0) = 1/(1 + e^{XB}) \rightarrow \frac{1}{1+1} = 1/2 \quad \text{as } XB \rightarrow 0$$

$$\rightarrow \frac{1}{1+0} = 1 \quad \text{as } XB \rightarrow -\infty$$

$$\rightarrow \frac{1}{1+\infty} = 0 \quad \text{as } XB \rightarrow \infty$$

2. Inherent Heteroscedasticity in OLS Regression of a Model With a Dichotomous Dependent Variable

Another problem that the dichotomous dependent variable creates in OLS is heteroscedasticity.[2/] This exists because (in the univariate case again)

$$y_i = \alpha + \beta x_i + \varepsilon_i$$

$$\begin{aligned} E(y_i) &= \alpha + \beta x_i \\ &= P(1)(1) + P(0) \cdot 0 \\ &= P(1) \end{aligned}$$

and

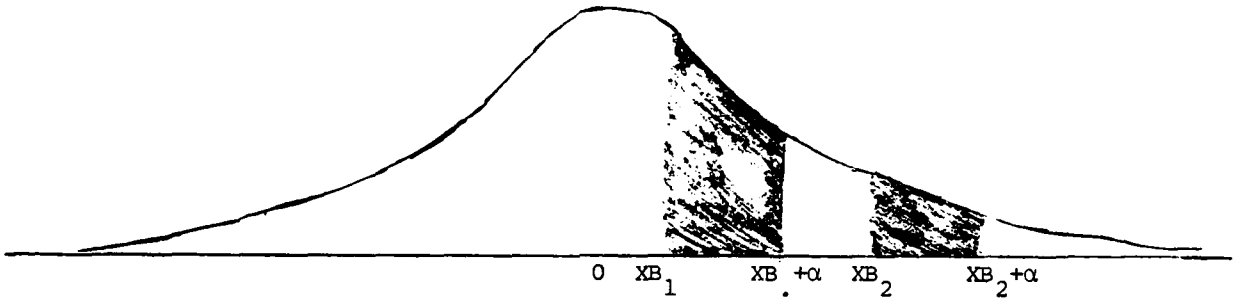
$$\begin{aligned} Var(\varepsilon_i) &= P(0)(\varepsilon_i(y=0))^2 + P(1)(\varepsilon_i(y=1))^2 \\ &= (1-\alpha-\beta x_i)(-\alpha-\beta x_i)^2 + (\alpha+\beta x_i)(1-\alpha-\beta x_i)^2 \\ &= (\alpha+\beta x_i)(1-\alpha-\beta x_i) = E(y_i)(1-E(y_i)). \end{aligned}$$

This means that the $Var(\varepsilon_i)$ is a function of y_i and hence is heteroscedastic. The use of MLE on the probit and logit transformation overcomes this problem. The maximum likelihood estimates are consistent and asymptotically efficient.

[2/] Jan Kimenta, Elements of Econometrics (New York: Macmillan Publishing, 1971; London: Collier Macmillan Publishers, 1971), p. 426.

3. The Interpretation of Probit and Logit Estimates as Partial Derivatives

Estimates obtained via the probit and logit transformation cannot be interpreted as simple partial derivatives as they are in OLS. The only way to derive the partial effect will depend on the values of all variables in the model. this can be seen more easily with the help of Figure 3.



$$XB = \alpha + \beta_1 X_1 + B_2 X_2 \ldots B_R X_R$$

$$\alpha = B_1 \cdot \Delta X_1$$

Figure 3
The Partial Effect of Any Probit Parameter is a
Function of All the Variables in the Model

The shaded areas in Figure 3 represent the change in the predicted probability caused by varying X_1. If values of the variables in the model yield a starting value of XB near zero (XB_1), then the partial effect of X will be relatively large.

The partial effects in the logit transformation are also a function of all the variables in the model.

$$P(1) = \frac{1}{e^{-XB}+1},$$

let $A = e^{-XB}+1$ so $p(1) = A^{-1}$

then

$$\frac{\partial p(1)}{\partial x_i} = \frac{\partial p(1)}{\partial A} \cdot \frac{\partial A}{\partial XB} \cdot \frac{\partial XB}{\partial x_i}$$

$$= -A^{-2} \cdot e^{-XB} \cdot (-1) \cdot \frac{\partial XB}{\partial x_i}$$

$$= \frac{e^{-XB}}{(e^{-XB}+1)^2} \cdot \frac{\partial XB}{\partial x_i} .$$

The partial derivative of any variable under logit estimation is a function of all the variables of the model. Still, a ball park estimate of these derivatives is obtainable with only general reference to the rest of the model.

If		then	
$XB \Rightarrow$	∞	$\frac{e^{-XB}}{(e^{-XB}+1)^2} \Rightarrow$	.00
$=$	1	$=$	.20
$=$	0	$=$	.25
$=$	-1	$=$	.20
$\Rightarrow$	$-\infty$	$\Rightarrow$	.00

The partial derivative is, at most, one-fourth of the logit estimate. Depending upon the value of XB, it may be considerably less than that.

APPENDIX B

THE COEFFICIENT OF MULTIPLE CORRELATION AS A MEASURE OF GOODNESS OF FIT IN A MODEL WITH A DICHOTOMOUS DEPENDENT VARIABLE

The R^2 statistic does not give as good a measure of fit in a model with a dichotomous dependent variable as in one with a continuous dependent variable. This can be seen by comparing scatter diagrams in Figure 1.

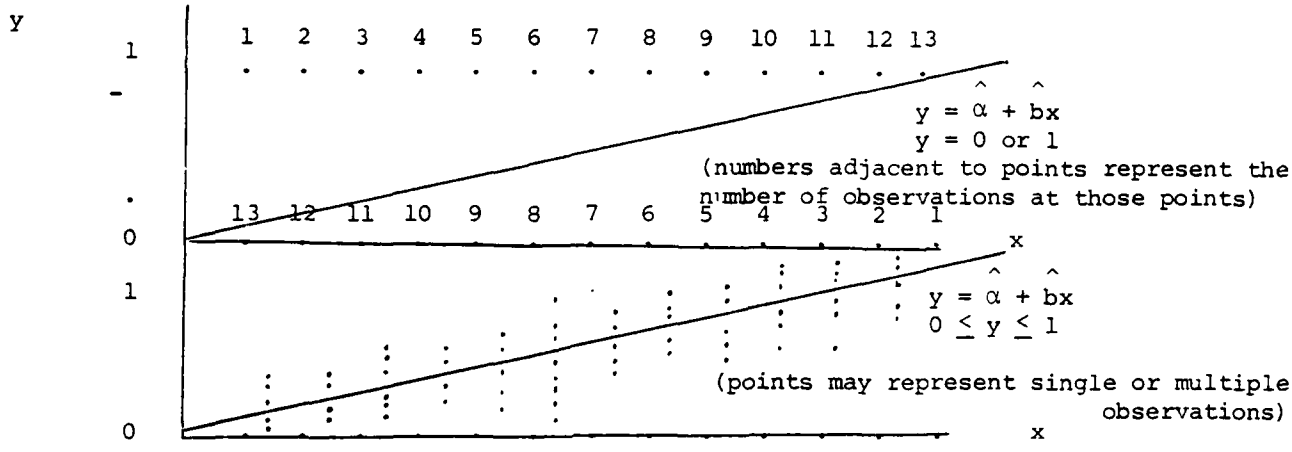


Figure 1

Minimizing the sum of the squared errors causes OLS to fit a line that comes closest to observation points where the most observations occur. A strong relationship between y and x might look like either of the scatter diagrams in Figure 1. The sum of the squared errors (SSE) is much greater for the dichotomous model. The total variation (SST) is also greater, however, so that opposing effects on R^2 are present.

$$R^2 = 1 - SSE/SST.$$

Intuitively, it seems that the composite effect is a poorer "fit" for the dichotomous model. The difference in the SSE in the two models is readily seen in the scatter diagrams. The observations in the continuous model cluster around the regression line. In the dichotomous model they are close to the regression line only for extreme values of x. The SST is less sensitive to the type of dependent variable. Observations in the dichotomous model are never close to the average value of y. In the continuous model most of the observations are also not close to the average value of y. While this hardly constitutes a formal proof, it does suggest that the SSE are disproportionately higher than the SST in dichotomous models.

This same point is made by Robert Pindyck and Daniel Rubinfeld.[1] They refer to work by Donald Morrison[2] and work by John Neter and Scott Maynes.[3] Neter and Maynes discuss the issue in reference to a simple correlation coefficient. Morrison's work is more directly attuned to this exposition. Simplistically, his idea is that an upper bound can be found for R^2 by substituting 0 or 1 for the predicted probabilities. His example yields an upper bound for R^2 of only .167.

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[1] R. S. Pindyck and D. L. Rubinfeld, Econometric Models and Economic Forecasts, (New York: McGraw Hill, 1976), p. 255.

[2] D.G. Morrison, "Upper Bounds for Correlations between Binary Outcomes and Probabilistic Predictions," Journal of the American Statistical Association 67 (March 1972): pp. 68-70.

[3] J. Neter and E. S. Maynes, "On the Appropriateness of the Correlation Coefficient with a 0, 1 Dependent Variable," Journal of the American Statistical Association 65 (June 1970): pp. 501-9.

APPENDIX C

DATA DOCUMENTATION

A. DMDC COHORT TAPE

Information about each reenlistment eligible was obtained from the Defense Manpower Data Center. This file contained a record for each reenlistee and each reenlistment eligible (Interservice Separation Code 01 through 03 inclusive), for a total of 15721 individuals who had enlisted between April and September 1978. The information contained in this data tape is listed in Table C-1. To this file, military pay, reenlistment bonus award levels, and home town and duty station economic conditions were attached.

B. MILITARY PAY

Military pay data was obtained from Manpower Requirements Report for FY 1978 and was added to each record based on pay grade and marital status. Specifically, military pay was defined as Basic Pay and Basic Allowance for Quarters and Subsistence and had the following values for the 1978 time period.

	MONTHLY PAY	
	SINGLE	MARRIED
E-3	$720.43	$764.83
E-4	783.73	837.43
E-5	814.33	875.83

C. REENLISTMENT BONUS AWARD LEVELS

The DMDC cohort file contained reenlistment bonus award levels only for those individuals who actually reenlisted. It was desirable to attach bonus information to those who did not reenlist as a measure of foregone payments. Bonus award levels were obtained from the Officer and Enlisted Retention Section (OP-136) (Table C-2).

TABLE C-1

DMDC DATA TAPE

CURRENT STATUS
- REENLISTMENT FLAG
- DATA OF ENTRY
- TERM OF ENLISTMENT
- DATA OF SEPARATION

GEOGRAPHIC LOCATION CODES
- HOME TOWN (PLACE OF RESIDENCE PRIOR TO ENLISTMENT)
  - CENSUS REGION AND DISTRICT
  - ZIP CODE
  - STATE AND COUNTY CODES
- DUTY STATION
  - UNIT IDENTIFICATION CODE (UIC)
  - ZIP OF UIC

SOCIOECONOMIC INFORMATION
- SEX
- RACE AND ETHNIC GROUP
- MARITAL STATUS
- NUMBER OF DEPENDENTS
- HIGHEST YEAR OF EDUCATION
- AGE AT ENTRY AND DATE OF BIRTH
- AFQT PERCENTILE AND AFQT GROUP

MILITARY FACTORS
- RATE
- NAVY ENLISTED CLASSIFICATION CODE
- PAY GRADE

REENLISTMENT BONUS INFORMATION (FOR REENLISTEES)
- AWARD LEVEL
- EFFECTIVE DATE OF BONUS
- NUMBER OF PAYMENTS AUTHORIZED
- LAST RECEIVED INSTALLMENT
- TYPE OF PAYMENT (LUMP SUM OR ANNUAL INSTALLMENTS) 1/
- RATE OR NEC FOR WHICH BONUS WAS PAID

1/ All individuals were coded as having received bonuses in the form of annual installments.

TABLE C-2

REENLISTMENT BONUS AWARD LEVELS
APRIL 1978

RATING	AWARD LEVEL
ABE	4
AC	4
AG	2
AT	4
AW	3
AX	3
BT	6
CTI	3
CTM	5
CTR	2
CTT	2
DS	6
EM	2
ET	5
EW	4
FTB	6
FTG	4
FTM	6
GMG	2
GMM	6
GMT	6
HT	3
IC	2
MM	5
MS	3
MT	6
OM	2
OS	4
OT	3
PR	2
SM	5
STG	5
STS	6
TD	2
TM	5

NEC	AWARD LEVEL
3351	6
3356	6
3357	6
3358	6
3359	6
3361	6
3363	6
3364	6
3365	6
3366	6
3383	6
3384	6
3385	6
3386	6
3389	6
3393	6
3395	6
3396	6
5311	3
5321	3
5322	3
5327	3
5332	4
5333	4
5342	4
5343	3
8493	3

The appropriate award level was attached to each individual whose NEC code or Rating code indicated that he would be eligible for a bonus. Persons who were in both an NEC and a rating which qualified them for a bonus were assigned the higher of the two award levels. This method of assigning bonuses does not account for those who may be eligible for a bonus of a different value from that of their rating or NEC (as listed in the cohort file). Detailed and totally accurate information about foregone bonuses of non-reenlistees would have been very difficult to obtain.

D. LOCAL WAGES

Civilian earnings were calculated form the Employment and Earnings data tape from the Bureau of Labor Statistics which contains average earnings and number employed for each state and selected Standard Metropolitan Statistical Areas (SMSAs) for more than one hundred Standard Industrial Classification (SIC) codes. Unfortunately, the only industry for which wages were available for all states and most SMSAs was total manufacturing. Hence, state weekly averages of this wage were calculated for each state and were used as the measure of civilian compensation.

E. UNEMPLOYMENT

Local Area Unemployment Statistics, published by the Bureau of Labor Statistics, contains monthly averages of number employed, number unemployed, and size of the total labor force for states, counties, and SMSAs. Annual average unemployment rates were calculated from this tape and were attached to the record of each reenlistment eligible based on home town and duty station zip codes.

AD-A100 850 INFORMATION SPECTRUM INC ARLINGTON VA F/G 5/1
LOCAL ECONOMIC FACTORS AFFECTING NAVY FIRST-TERM REENLISTMENT.(U)
OCT 80 M T COWIN, F E O'CONNOR, A S RHODE N00014-79-C-0155
UNCLASSIFIED ISI-V-0521-02 NL

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APPENDIX D

MEANS OF VARIABLES, CORRELATION COEFFICIENTS, AND PRELIMINARY OLS RESULTS

TABLE D-1

ADMINISTRATIVE RATINGS

MEANS OF VARIABLES

	STOREKEEPERS		CLERICAL		HEALTH	TOTAL	
	SEA	SHORE	SEA	SHORE	SHORE	SEA	SHORE
REENLIST	.472	.394	.522	.500	.415	.477	.399
HOME UNEMP: '75	.079	.077	.080	.078	.079	.078	.078
HOME UNEMP: '76	.070		.069			.068	
ΔHOME UNEMP	.023		.016			.010	
HOME RWAGE	.963	.998	.993	.995	.987		.995
DUTY UNEMP: '78		.079		.078	.078		.077
ΔDUTY UNEMP		.078		.077	.072		.070
DUTY RWAGE		.998		1.022	1.033		1.032
SEX	.035	.340	.059	.493	.323	.033	.367
RACE	.254	.297	.188	.184	.104	.199	.148
MARITAL STAT	.338	.386	.386	.390	.432	.354	.437
H.S. GRAD	.841	.880	.900	.919	.973	.857	.925
AGE: 21	.162	.162	.147	.118	.112	.192	.148
AGE: 24 +	.236	.297	.287	.390	.328	.217	.322
AFQT: I	.007	.004	.004	.004	.024	.005	.016
AFQT: II	.197	.139	.368	.202	.352	.275	.247
AFQT: IV	.095	.073	.088	.040	.005	.085	.032
AWARD	.056	.019	.018	0	.015	.632	.241
E-3	.092	.073	.088	.026	0	.083	.032
E-5	.204	.205	.386	.447	.265	.232	.300
N OF CASES	485	262	273	351	841	1349	1772

TABLE D-2

HIGH TECHNOLOGY RATINGS

MEANS OF VARIABLES

	RADIO		ELECTRICIANS		WEAPONS	
	SEA	SHORE	SEA	SHORE	SEA	SHORE
REENLIST	.521	.345	.527	.295	.703	.387
HOME UNEMP:'75	.078	.076	.077	.075	.078	.080
HOME UNEMP:'78	.067		.067		.069	
ΔHOME UNEMP	-.028		-.007		.019	
HOME RWAGE	.828	.842	.835	.854	.847	.840
DUTY UNEMP:'78		.081		.080		.079
ΔDUTY UNEMP		.071		.080		.069
DUTY RWAGE		.841		.865		.840
SEX	.101	.297	.001	.046	0	0
RACE	.214	.165	.086	.093	.074	.078
MARITAL STAT	.373	.366	.374	.413	.411	.456
H.S. GRAD	.825	.876	.882	.833	.820	.783
AGE: 21	.230	.189	.216	.214	.269	.277
AGE: 24+	.185	.269	.191	.160	.153	.129
AFQT: I	.003	0	.060	.018	.013	.005
AFQT: II	.183	.205	.539	.473	.510	.345
AFQT: IV	.032	.028	.027	.036	.044	.060
AWARD	.021	0	1.803	.986	4.561	3.834
E-3	.101	.036	.042	.043	.051	.028
E-5	.310	.289	.522	.466	.574	.387
N OF CASES	378	249	755	381	548	223

TABLE D-3

MECHANICAL RATINGS

MEANS OF VARIABLES

	METAL WORKERS		ENGINE		TOTAL	
	SEA	SHORE	SEA	SHORE	SEA	SHORE
REENLIST	.533	.318	.558	.353	.490	.267
HOME UNEMP:'75	.079	.075	.078	.078	.077	.079
HOME UNEMP:'78	.069		.070		.068	
ΔHOME UNEMP	.010				-.005	
HOME RWAGE	.843	.851		.835	.823	.831
DUTY UNEMP:'78		.080		.078		.081
ΔDUTY UNEMP		.076		.071		.079
DUTY RWAGE		.873		.885		.853
SEX	.003	.014		.029	.004	.058
RACE	.090	.072		.063	.124	.078
MARITAL STAT	.386	.401		.441	.382	.399
H.S. GRAD	.776	.722		.824	.760	.764
AGE: 21	.224	.267		.232	.239	.252
AGE: 24+	.159	.137		.191	.157	.178
AFQT: I	.003	.007		.040	.014	.008
AFQT: II	.321	.325		.404	.322	.330
AFQT: IV	.047	.040		.033	.059	.019
AWARD	1.555	.816		1.654	1.985	1.399
E-3	.075	.072		.103	.178	.229
E-5	.458	.329		.412	.348	.326
N OF CASES	860	472	1282	726	4667	2553

TABLE D-4

MECHANICAL RATINGS

MEANS OF VARIABLES

	DECK		TOTAL	
	SEA	SHORE	SEA	SHORE
REENLIST	.414	.258	.490	.267
HOME UNEMP: '75	.077	.079	.077	.079
HOME UNEMP: '78	.067		.068	
ΔHOME UNEMP	-.009		-.005	
HOME RWAGE	.842	.817	.823	.831
DUTY UNEMP: '78		.081		.081
ΔDUTY UNEMP		.075		.079
DUTY RWAGE		.852		.854
SEX	.006	.030	.004	.058
RACE	.253	.170	.124	.078
MARITAL STAT	.419	.428	.382	.399
H.S. GRAD	.662	.690	.760	.764
AGE: 21	.254	.236	.239	.252
AGE: 24+	.155	.114	.157	.178
AFQT: I	0	.007	.014	.008
AFQT: II	.129	.166	.322	.330
AFQT: IV	.129	.122	.059	.019
AWARD	.564	.790	1.985	1.399
E-3	.084	.096	.178	.229
E-5	.214	.173	.348	.326
N OF CASES	645	275	4667	2553

TABLE D-5a

CORRELATIONS BETWEEN VARIABLES

MECHANICAL: ASHORE

	SEX	RACE	MARITAL	HS GRAD	AGE: 21	AGE: 24	AFQT: I	AFQT: II	AFQT: IV
REENLIST	-.00	.02	.08	-.03	-.13	.06	.05	.14	.04
AWARD	-.07	.03	.07	.01	-.04	.01	.06	.03	-.01
E-3	.18	.12	-.24	-.09	.13	-.08	-.05	-.17	-.01
E-5	-.03	-.11	.11	.17	-.14	.00	.13	.22	-.10
HOME UNEM: '75	-.02	-.02	-.05	.01	.01	-.05	-.01	.03	-.03
HOME UNEM: '76	-.03	-.02	.00	-.02	.04	-.07	-.02	.07	-.08
HOME UNEM: '78	.01	.06	.04	-.05	-.05	-.06	.00	.02	-.06
HOME RWAGE	-.04	.01	.27	-.03	-.10	.05	-.01	.05	.06
DUTY UNEM: '78	-.00	-.06	.00	-.05	.08	-.03	-.06	-.01	.10
ΔDUTY UNEM	.02	-.08	-.04	.01	.05	-.03	-.04	.06	.00
DUTY RWAGE	-.06	-.06	.30	.14	-.13	.03	.00	.12	-.05
SEX	1.00	-.07	-.10	.14	-.14	.06	-.02	-.17	-.03
RACE		1.00	-.09	.11	-.03	.09	-.03	-.17	.17
MARITAL STAT			1.00	-.01	-.02	.12	.02	-.03	.00
HS GRAD				1.00	-.29	.12	.05	.12	.08
AGE: 21					1.00	—	-.05	-.12	-.02
AGE: 24						1.00	.07	-.02	-.07
AFQT: I							1.00	—	—
AFQT: II								1.00	—
AFQT: IV									1.00

TABLE D-5b

CORRELATIONS BETWEEN VARIABLES

MECHANICAL: ASHORE

	HOME UNEM: '75	HOME UNEM: '76	HOME UNEM: '78	HOME RWAGE	DUTY UNEM: '78	ΔDUTY UNEM	DUTY RWAGE
REENLIST	-.03	-.02	-.03	.14	-.08	.01	.09
AWARD	-.05	-.11	-.17	.05	-.10	-.06	.07
E-3	.08	.07	.03	-.33	-.00	-.12	-.36
E-5	-.10	-.12	-.06	.21	-.06	.08	.37
HOME UNEM: '75	1.00	.80	.67	-.02	.11	-.07	-.12
HOME UNEM: '76		1.00	.82	.02	.08	-.06	-.12
HOME UNEM: '78			1.00	.03	.12	-.03	-.07
HOME RWAGE				1.00	-.17	-.01	.40
DUTY UNEM: '78					1.00	.03	-.53
ΔDUTY UNEM: '78						1.00	.11
DUTY RWAGE							1.00

TABLE D-6a

CORRELATIONS BETWEEN VARIABLES

ADMINISTRATIVE: ASHORE

	SEX	RACE	MARITAL	HS GRAD	AGE: 21	AGE: 24	AFQT: I	AFQT: II	AFQT: IV
REENLIST	.20	.11	-.02	.00	-.08	.19	-.02	-.11	.13
AWARD	-.12	-.05	-.04	-.15	.09	-.12	-.04	-.10	-.02
E-3	.06	.17	.02	-.07	-.02	-.03	-.02	-.06	.16
E-5	.07	-.12	.04	.05	-.07	.10	.10	.17	-.12
HOME UNEM: '75	-.00	-.03	.03	.06	-.09	.07	-.02	-.01	.04
HOME UNEM: '76	.01	.01	.03	.05	-.08	.07	-.04	-.03	.05
HOME UNEM: '78	.04	-.04	.03	.04	-.08	.09	-.04	-.03	.03
HOME RWAGE	-.03	.10	.24	-.03	.08	.05	-.01	-.10	.03
DUTY UNEM: '78	.05	-.05	-.06	-.00	.01	-.01	.01	-.08	.14
ΔDUTY UNEM	.01	-.03	-.08	.06	.03	.04	-.03	.03	.04
DUTY RWAGE	-.11	-.03	.23	.05	-.05	.02	.04	.09	-.11
SEX	1.00	-.03	.07	.20	-.23	.17	-.10	-.41	.14
RACE		1.00	-.05	-.11	.00	.09	-.05	-.13	.14
MARITAL STAT			1.00	-.04	-.18	.13	.06	-.05	.02
HS GRAD				1.00	-.28	.13	.04	.07	.05
AGE: 21					1.00	—	-.05	.04	-.08
AGE: 24+						1.00	.00	-.01	.10
AFQT: I							1.00	—	—
AFQT: II								1.00	—
AFQT: IV									1.00

TABLE D-6b

CORRELATIONS BETWEEN VARIABLES
ADMINISTRATIVE: ASHORE

	HOME UNEM: '75	HOME UNEM: '76	HOME UNEM: '78	HOME RWAGE	ΔDUTY UNEM: '78	DUTY UNEM	DUTY RWAGE
REENLIST	.04	.02	-.02	.06	.09	.01	-.06
AWARD	.00	.04	-.03	.01	.09	.02	-.12
E-3	.01	.05	.07	-.04	.08	.00	-.17
E-5	-.04	.02	-.01	.18	-.05	.10	.17
HOME UNEM:'75	1.00	.80	.68	.15	-.01	.04	.02
HOME UNEM:'76		1.00	.89	.13	-.04	.03	.03
HOME UNEM:'78			1.00	.06	-.02	.04	-.01
HOME RWAGE				1.00	-.08	-.02	.27
DUTY UNEM:'78					1.00	.12	-.47
ΔDUTY UNEM						1.00	-.16
DUTY RWAGE							1.00

TABLE D-7a

CORRELATIONS BETWEEN VARIABLES

HIGH TECHNOLOGY

	SEX	RACE	MARITAL	HS GRAD	AGE:21	AGE:24	AFQT:I	AFQT:II	AFQT:IV
REENLIST	.17	.17	.18	.07	-.11	.13	.01	.05	.02
AWARD	-.13	-.24	.13	.04	.01	-.05	.14	.03	.01
E-3	-.07	.00	-.08	-.03	-.02	-.02	-.04	.00	-.03
E-5	.07	-.04	.03	.12	-.11	.19	.17	.18	-.12
HOME UNEM:'75	-.02	-.03	.00	-.06	-.06	.08	-.01	-.11	.15
HOME UNEM:'76	.02	-.02	.02	-.07	-.06	.03	-.06	-.08	.08
HOME UNEM:'78	.06	-.02	.03	-.06	-.07	.04	-.04	-.07	-.06
HOME RWAGE	.02	.17	.23	-.05	-.10	.09	-.07	.04	.00
DUTY UNEM:'78	-.12	-.10	-.17	-.01	.03	-.13	.10	.02	-.06
ΔDUTY UNEM	.08	.03	.00	.05	-.01	.05	.08	.02	-.03
DUTY RWAGE	-.02	-.01	.36	.01	.05	.09	-.02	.12	.00
SEX	1.00	.10	-.05	.11	-.16	.11	-.05	-.20	-.04
RACE		1.00	.03	-.01	-.10	.25	-.05	-.15	.15
MARITAL STAT			1.00	-.03	-.08	.11	.02	.08	-.01
HS GRAD				1.00	-.36	.10	.06	.10	.05
AGE: 21					1.00	—	-.09	.00	-.01
AGE: 24+						1.00	.08	.02	.14
AFQT: I							1.00	—	—
AFQT: II								1.00	—
AFQT: IV									1.00

TABLE D-7b

CORRELATIONS BETWEEN VARIABLES
HIGH TECHNOLOGY: SHORE

	HOME UNEMP: '75	HOME UNEM:'76	HOME UNEM:'78	HOME RWAGE	DUTY UNEM:'78	ΔDUTY UNEM	DUTY RWAGE
REENLIST	-.11	-.09	-.05	.16	-.06	.12	.16
AWARD	.04	.01	.03	-.03	.02	.08	.18
E-3	-.08	-.07	-.06	-.16	-.01	-.01	-.14
E-5	-.04	-.02	-.01	.12	.01	-.04	.24
HOME UNEM:'75	1.00	.83	.70	.17	-.13	-.05	.04
HOME UNEM:'76		1.00	.88	.11	-.17	-.03	.06
HOME UNEM:'78			1.00	.09	-.14	.03	.07
HOME RWAGE				1.00	-.11	.12	.27
DUTY UNEM:'78					1.00	.19	-.41
ΔDUTY UNEM						1.00	.15
DUTY RWAGE							1.00

TABLE D-8

PRELIMINARY OLS RESULTS

MECHANICAL RATINGS WITH ASHORE ZIP CODES

COEFFICIENTS (F-STATISTICS) OF

VARIABLES WITH F-STATISTICS $\geq$ 2.50

	ENGINE	METAL WORKERS	DECK	TOTAL
HOME UNEMP:'75				
HOME RWAGE				
DUTY UNEMP:'78	-4.61 (7.63)	-5.13 (4.77)		
ΔDUTY UNEMP		+1.28 (3.46)		
DUTY RWAGE		- .56 (2.69)		
SEX	+.44 (6.90)			
RACE				
MARITAL STAT	+.14 (5.65)		+.15 (6.32)	
H.S. GRAD				
AGE: 21				
AGE: 24+		+.28 (9.96)		
AFQT: I	+.41 (7.71)			
AFQT: II	+.17 (7.95)			+.12 (3.71)
AFQT: IV	+.30 (3.26)		+.14 (2.64)	
AWARD				
E-3				-.14 (3.02)
E-5	+.17 (7.19)	+.11 (2.54)		
R^2	.19	.11	.10	.09
SAMPLE SIZE	272	277	271	258

TABLE D-9

PRELIMINARY OLS RESULTS

ADMINISTRATIVE RATINGS

COEFFICIENTS (F-STATISTICS) OF

VARIABLES WITH F-STATISTICS $\geq$ 2.50

	CLERICAL		STOREKEEPERS		HEALTH	TOTAL
	AFLOAT	ASHORE	AFLOAT	ASHORE	ASHORE	ASHORE
HOME UNEMP: '75			+3.11 (2.67)			
HOME UNEMP: '78		N/A				
ΔHOME UNEMP		N/A				
HOME RWAGE				+.33 (3.07)		
DUTY UNEMP:'78						
ΔDUTY UNEMP						
SEX	+.31 (5.55)	+.14 (3.96)	+.52 (10.63)	+.26 (11.52)		+.21 (10.81)
RACE						+.14 (3.86)
H.S. GRAD			-.20 (5.29)		-.16 (3.91)	
AGE: 21		+.21 (4.28)			+.09 (2.62)	
AGE: 24+		+.19 (8.38)				+.15 (7.12)
AFQT: I						
AFQT: II		-.19 (4.73)	+.16 (3.88)			
AFQT: IV						+.41 (7.54)
AWARD			+.16 (6.03)	+.27 (4.12)		
E-3					N/A	
E-5			+.17 (4.71)		+.18 (9.99)	+.15 (6.53)
R^2	.09	.14	.13	.14	.07	.13
SAMPLE SIZE	272	272	284	259	412	373

TABLE D-10

PRELIMINARY OLS RESULTS
HIGH TECHNOLOGY RATINGS WITH ASHORE ZIP CODES
COEFFICIENTS (F-STATISTICS) OF
VARIABLES WITH F-STATISTICS ≥ 2.50

	WEAPONS	SONAR	ELECTRICAL	ELECTRONICS	RADIO	TOTAL
HOME UNEMP: '75					+2.38	-2.75
					(2.75)	(4.31)
HOME RWAGE						
	-.893		-4.62			
DUTY UNEMP: '78	(12.18)		(4.57)			
	-2.64		+1.75			
ΔDUTY UNEMP	(7.98)		(8.92)			
			-.62			
DUTY RWAGE			(4.55)			
					+.35	+.27
SEX	N/A				(20.22)	(6.73)
RACE		+.25		+.36	+.29	+.30
		(3.65)		(6.71)	(12.56)	(7.70)
MARITAL STAT			+.15	+.17		+.11
			(5.97)	(6.96)		(3.48)
AGE: 21			-.17			
			(5.78)			
AGE: 24 +						
AFQT: I	+.83				N/A	
	(3.05)					
AFQT: II		+.17				
		(6.13)				
AFQT: IV						
AWARD				+.05	N/A	+.05
				(9.50)		11.47)
E-3			-.30	-.34		
			(4.20)	(4.34)		
E-5		+.15	+.17	+.22		+.17
		(5.38)	(8.03)	(12.24)		(7.62)
R^2	.15	.11	.13	.23	.18	.20
SAMPLE SIZE	217	282	281	241	249	267

APPENDIX E

PROBIT EQUATIONS; SUBPOPULATION MEANS OF SELECTED VARIABLES

TABLE E-1

DETERMINANTS OF REENLISTMENT OR EXTENSION
ADMINISTRATIVE RATINGS: ASHORE

	TOTAL		CLERICAL		HEALTH	
	μ	MLE (Standard Error)	μ	MLE (Standard Error)	μ	MLE (Standard Error)
HOME UNEM: 75	.0784	+1.628 (1.505)	.0779	+1.996 (2.569)	.0781	+1.668 (2.095)
HOME RWAGE	.8493	+ .001 (.215)	.8549	+ .260 (.351)	.8489	- .007 (.308)
DUTY UNEM: 78	.0782	+1.480 (3.489)	.0781	-2.237 (6.281)	.0765	+3.761 (4.619)
ΔDUTY UNEM	.0726	- .595 (.773)	.0784	-2.812** (1.555)	.0694	- .133 (1.035)
DUTY RWAGE	.8781	+ .079 (.425)	.8735	-1.818*** (.638)	.8947	- .358 (.593)
SEX	.3270	+ .356*** (.090)	.4038	+ .678*** (.140)	.3496	+ .133 (.124)
RACE	.1479	+ .221** (.098)	.2232	+ .024 (.135)	.0916	+ .194 (.158)
MARITAL STAT	.4264	+ .123** (.074)	.4126	+ .122 (.120)	.4352	+ .009 (.102)
H.S. GRAD	.9258	+ .039 (.140)	.9148	+ .188 (.217)	.9691	- .112 (.274)
AGE: 21	.1276	- .029 (.108)	.1278	+ .150 (.178)	.1106	- .054 (.156)
AGE: 24+	.3166	+ .217*** (.073)	.3407	+ .364*** (.116)	.3222	+ .186** (.100)
AFQT: I & II	.2822	+ .117 (.095)	.1909	- .277* (.178)	.3686	+ .258** (.123)
AFQT: III ∠	.1945	+ .183** (.100)	.2379	+ .482*** (.151)	.0987	+ .104 (.170)
AFQT: IV	.0037	+ .583*** (.191)	.0587	+ .596*** (.241)		
AWARD	.2595	+ .078** (.041)	.0103	+2.480 (31.752)	.0071	+ .879 (21.24)
E-3	.0331	- .564*** (.214)	.0441	- .486** (.289)		
E-5	.2613	+ .380 (.079)***	.3436	+ .169* (.120)	.2806	+ .572*** (.105)
NORTHEAST	.1092	- .582*** (.128)	.1189	- .603*** (.210)	.0892	- .224 (.182)
MIDATLANTIC	.2552	- .162 (.185)	.2731	+ .240 (.260)	.2889	+ .039 (.259)
MIDWEST	.0319	+ .002 (.215)	.0338	+ .312 (.342)	.0357	- .153 (.296)
SOUTHEAST	.1644	+ .133 (.163)	.1703	+ .535** (.240)	.1736	+ .058 (.230)
CONSTANT		- .939** (.497)		+ .481 (.913)		- .814 (.686)
R^2		.13		.33		.12
N		1450		681		841

Significance

* .90
** .95
*** .99

TABLE E-2

DETERMINANTS OF REENLISTMENT
ADMINISTRATIVE RATINGS
AFLOAT

	TOTAL		CLERICAL	
	μ	MLE (Standard Error)	μ	MLE (Standard Error)
HOME UNEM: 75	.0788	+1.537 (2.221)	.0786	+4.465* (2.954)
HOME UNEM: 78	.0682	-.402 (2.998)	.0685	-4.384 (3.984)
ΔHOME UNEM	.0055	-.230* (.171)	.0160	-.138 (.242)
HOME RWAGE	.8364	+.272 (.226)	.8468	-.411 (.303)
SEX	.0290	+1.029*** (.228)	.0363	+1.170*** (.290)
RACE	.1865	+.259*** (.094)	.2319	+.207** (.114)
MARITAL STAT	.3475	+.253*** (.072)	.3560	+.332 (.095)
H.S. GRAD	.8539	-.209** (.102)	.8782	-.342*** (.145)
AGE: 21	.1960	+.071 (.091)	.1733	0.026 (.128)
AGE: 24 +	.2175	+.207*** (.085)	.2354	+.273*** (.109)
AFQT: I	.0074	+1.060*** (.450)		
AFQT: II	.2889	+.115 (.091)	.2904	+.043 (.125
AFQT: III L	.3347	-.032 (.089)	.3431	-.080 (.121)
AFQT: IV	.0795	+.023 (.139)	.0890	+.056 (.178)
AWARD	.5838	+.210*** (.030)	.0363	+3.718 (16.383)
E-3	.0855	-.322*** (.127)	.0691	-.172 (.184)
E-5	.2559	+.124* (.083)	.2705	+.141* (.109)
ATLANTIC	.5529	-.075 (.068)	.5468	-.040 (.092)
CONSTANT		-.548** (.294)		+.200 (.387)
R^2		.12		.69
N		1450		859

Significance

* .90
** .95
*** .99

TABLE E-3

DETERMINANTS OF REENLISTMENT
MECHANICAL RATINGS
ASHORE

	TOTAL		ENGINE	
	μ	MLE (Standard Error)	μ	MLE (Standard Error)
NONE UNEM: 75	.0780	-1.167 (1.381)	.0783	-.248 (2.609)
NONE RWAGE	.8328	+.140 (.183)	.8347	+.676** (.334)
DUTY UNEM: 78	.0794	-13.890*** (2.550)	.0779	-19.360*** (4.100)
ΔDUTY UNEM:	.0760	+1.774*** (.677)	.0743	-.101 (1.339)
DUTY RWAGE	.8584	+.576 (.439(	.8827	+.156 (.784)
SEX	.0677	+.708*** (.117)	.0304	+.873*** (.299)
RACE	.0942	+.346*** (.098)	.0566	+.498** (.233)
MARITAL STAT	.4168	+.209*** (.064)	.4351	+.119 (.121)
H.S. GRAD	.7768	-.215*** (.074)	.8246	-.230* (.150)
AGE: 21	.2337	-.001 (.073)	.2445	+.121 (.134)
AGE: 24 +	.1756	+.150** (.075)	.1740	+.275** (.141)
AFQT: I & II	.3291	+.126** (.073)	.4378	+.279** (.130)
AFQT: III L	.2826	+.078 (.076)	.2169	-.266* (.161)
AFQT: IV	.0433	+.289** (.145)	.0276	+.273 (.319)
AWARD	1.2589	+.015 (.014)	1.5981	+.006 (.025)
E-3	.2433	-.208*** (.085)	.0939	-.634*** (.252)
E-5	.2794	+.404*** (.071)	.3619	+.351*** (.125)
NORTHEAST	.1126	-.662*** (.111)	.1022	-.334** (.199)
MID ATLANTIC	.2044	-.646*** (.155)	.2486	-.752*** (.273)
MIDWEST	.0156	-.454** (.278)	.0249	-.771** (.379)
SOUTHEAST	.1960	-.246** (.139)	.1727	-.230 (.256)
CONSTANT		-.114 (.503)		+.376 (.889)
R^2		.16		.24
N		2553		726

Significance
* .90
** .95
*** .99

TABLE E-4

DETERMINANTS OF REENLISTMENT
MECHANICAL RATINGS
AFLOAT

	TOTAL		ENGINE		METAL WORKERS	
	μ	(Standard Error)	μ	(Standard Error)	μ	MLE (Standard Error)
HOME UNEM: 75	.0772	+1.872* (1.262)	.0765	+4.309** (2.52)	.0789	-3.031 (2.782)
HOME UNEM: 76	.0681	-3.026* (1.735)	.0671	-2.656 (3.488)	.0694	+2.301 (3.702)
ΔHOME UNEM	-.0037	+.163** (.094)	-.0104	+.261* (.181)	.0118	+.106 (.225)
HOME WAGE	.8230	-.062 (.118)	.8175	-.110 (.225)	.8381	+.049 (.287)
SEX	.0038	+1.360*** (.411)			.0035	+5.145 (73.574)
RACE	.1256	+.212*** (.061)	.0769	+.184 (.145)	.0840	+.181 (.165)
MARITAL STAT	.3480	+.235*** (.040)	.3799	+.196*** (.078)	.3932	+.358*** (.096)
H.S. GRADUATE	.7584	-.082** (.050)	.8367	-.037 (.108)	.7771	-.056 (.117)
AGE: 21	.2394	-.086** (.049)	.2347	-.146* (.093)	.2252	-.208** (.115)
AGE: 24+	.1548	+.151*** (.055)	.1472	+.148* (.110)	.1424	+.014 (.132)
AFQT: I			.0353	+1.239*** (.271)		
AFQT: II	.3337	+.262*** (.049)	.4411	+.591*** (.091)	.3384	+.048 (.107)
AFQT: III L	.3043	+.060 (.051)	.2316	+.120 (.106)	.2497	-.086 (.116)
AFQT: IV	.0596	+.102 (.088)	.0314	+.033 (.219)	.0362	-.157 (.246)
AWARD	2.0401	+.064*** (.008)	2.960	+.076*** (.015)	1.6546	+.095*** (.029)
E-3	.1802	-.128*** (.054)	.0777	-.329** (.143)	.0723	-.076 (.178)
E-5	.3434	+.292*** (.044)	.4498	+.243*** (.082)	.4306	+.417*** (.097)
ATLANTIC	.5069	-.011 (.038)	.5330	+.018 (.075)	.5006	-.081 (.090)
CONSTANT		-.286** (.158)		-.566** (.310)		-.226 (.356)
R^2		.10		.19		.17
N		4667		1282		860

Significance
* .90
** .95
*** .99

TABLE E-5
DETERMINANTS OF REENLISTMENT
HIGH TECHNOLOGY RATINGS
ASHORE

	TOTAL		SONAR & ELECTRONICS	
	μ	MLE (Standard Error)	μ	MLE (Standard Error)
HOME UNEM: 75	.0778	-.257	.0783	-1.008
		(1.429)		(2.293)
HOME RWAGE	.8550	+.365*	.8576	+.070
		(.200)		(.313)
DUTY UNEM: 78	.0791	-10.065***	.0790	-15.411***
		(2.859)		(4.205)
ΔDUTY UNEM	.0759	+1.158**	.0769	+1.590*
		(.699)		(1.093)
DUTY RWAGE	.8689	+.320	.8655	+.354
		(.362)		(.574)
SEX	.1329	+.500***	.1303	+.181
		(.103)		(.162)
RACE	.0832	+.465***	.0585	+.639***
		(.111)		(.218)
MARITAL STAT	.4102	+.233***	.4122	+.371***
		(.066)		(.110)
H.S. GRAD	.8935	-.028	.9388	+.203
		(.106)		(.216)
AGE: 21	.1902	-.004	.1649	+.061
		(.084)		(.143)
AGE: 24 +	.2201	+.014	.2434	-.010
		(.076)		(.120)
AFQT: I	.0319	+.414**	.0572	+.007
		(.180)		(.236)
AFQT: II	.4533	+.230***	.5066	+.329
		(.079)		(.125)
AFQT: III L	.1678	-.063	.1130	+.198
		(.099)		(.177)
AFQT: IV	.0223	+.173	.0080	+.869*
		(.213)		(.674)
AWARD	2.1045	+.086***	2.5465	+.087***
		(.016)		(.031)
E-3	.0345	-.523***	.0346	-.435*
		(.199)		(.302)
E-5	.4604	+.238***	.5106	+.412***
		(.066)		(.108)
NORTHEAST	.1116	-.921***	.0798	-.857***
		(.121)		(.206)
MIDATLANTIC	.2480	-.475***	.2434	-.705***
		(.142)		(.199)
MIDWEST	.0309	0.012	.0186	-1.649***
		(.196)		(.469)
SOUTHEAST	.1420	-.380***	.1569	
		(.142)		(.213)
CONSTANT		-.412		+.178
		(.439)		(.696)
R^2		.19		.24
N		1907		710

Significance
* .90
** .95
*** .99

TABLE E-6

DETERMINANTS OF REENLISTMENT
HIGH TECHNOLOGY RATINGS
AFLOAT

	TOTAL		ELECTRICIANS		SONAR & ELECTRONICS	
	μ	MLE (Standard Error)	μ	MLE (Standard Error)	μ	MLE (Standard Error)
HOME UNEM: 75	.0773	+.700 (1.533)	.0771	+3.058 (3.272)	.0770	+1.437 (3.281)
HOME UNEM: 78	.0679	-1.806 (2.052)	.0673	-2.669 (4.468)	.0681	-.768 (4.318)
ΔHOME UNEM	-.0093	-.005 (.112)	-.0067	-.135 (.243)	-.0127	+.045 (.226)
HOME RWAGE	.8343	.261* (.152)	.8347	+.140 (.324)	.8432	-.776** (.327)
SEX	.0206	+.965*** (.183)	.0013	+4.668 (127.462)	.0253	+.267 (.318)
RACE	.0842	+.380*** (.089)	.0861	+.368** (.186)	.0430	+.497** (.270)
MARITAL STAT	.3770	+.354*** (.051)	.3735	+.307*** (.112)	.3855	+.470*** (.110)
H.S. GRAD	.8848	+.022 (.077)	.8821	-.048 (.160)	.9427	-.058 (.212)
AGE: 21	.2128	-.028 (.061)	.2159	+.117 (.128)	.1872	-.022 (.131)
AGE: 24 +	.2069	-.000 (.062)	.1907	+.373*** (.134)	.2313	-.066 (.126)
AFQT: I	.0555	+1.064*** (.147)	.0596	+.853*** (.301)	.0958	+.767*** (.241)
AFQT: II	.5618	+.284*** (.060)	.5391	+.192* (.123)	.7126	+.208* (.143)
AFQT: III L	.1406	-.049 (.079)	.1536	-.249* (.165)	.0474	-.419** (.240)
AFQT: IV	.0203	-.062 (.164)	.0265	-.135 (.309)	.0022	4.146 (90.011)
AWARD	2.8782	+.128*** (.012)	1.803	+.282*** (.043)	3.2522	+.093*** (.025)
E-3	.0534	-.311*** (.105)	.0424	-.593** (.269)	.0352	-.277 (.245)
E-5	+.5340	+.449*** (.050)	.5219	+.416*** (.104)	.6189	.534*** (.104)
ATLANTIC	+.5904	-.072* (.048)	.5404	-. 198** (.101)	.6167	-.055 (.104)
CONSTANT		-.280* (.201)		-.958** (.429)		+.513 (.482)
R^2		.24		.34		.24
N		3350		755		833

Significance
* .90
** .95
*** 99

TABLE E-7

SUBPOPULATION MEANS OF
SELECTED VARIABLES
ADMINISTRATIVE: ASHORE

	NON HS GRAD	AFQT: I & II	AFQT: IIIL & IV
SEX	0	.05	.14
RACE	.21	.05	.39
MARITAL STAT	.53	.41	.44
H.S. GRAD	—	.93	.83
AGE: 21	.33	.16	.21
AGE: 24 +	.09	.33	.26
AFQT: I & II	.16	—	—
AFQT: IIIL & IV	.59	—	—
E-3	.12	.05	.07
E-5	.17	.52	.16

TABLE E-7 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
ADMINISTRATIVE: ASHORE

	AGE: 21	AGE: 24+	E-3	E-5
SEX	.09	.53	.13	.50
RACE	.17	.26	.40	.14
MARITAL STAT.	.39	.44	.30	.41
H.S. GRAD	.67	.98	.77	.96
AGE: 21	—	—	.33	.10
AGE: 24+	—	—	.23	.46
AFQT: I & II	.23	.18	.23	.29
AFQT: IIIL & IV	.48	.22	.47	.14
E-3	.11	.03	—	—
E-5	.27	.46	—	—

TABLE E-8

SUBPOPULATION MEANS OF
SELECTED VARIABLES
ADMINISTRATIVE: AFLOAT

	NON HS GRAD	AFQT: I & II	AFQT: IIIL & IV
SEX	0	0	0
RACE	.17	.06	.33
MARITAL STAT	.38	.35	.36
H.S. GRAD	—	.93	.81
AGE: 21	.47	.18	.20
AGE: 24 +	.12	.24	.20
AFQT: I & II	.14	—	—
AFQT: IIIL & IV	.58	—	—
E-3	.16	.03	.10
E-5	.08	.41	.11
ATLANTIC	.55	.54	.50

TABLE E-8 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
ADMINISTRATIVE RATINGS: AFLOAT

	AGE: 21	AGE: 24+	E-3	E-5
SEX	.01	.07	0	.06
RACE	.15	.28	.18	.12
MARITAL STAT.	.34	.43	.29	.39
H.S. GRAD	.65	.92	.72	.95
AGE: 21	—	—	.11	.21
AGE: 24+	—	—	.06	.30
AFQT: I & II	.26	.31	.12	.49
AFQT: IIIL & IV	.45	.41	.51	.20
E-3	.26	.16	—	—
E-5	.17	.28	—	—
ATLANTIC	.59	.57	.56	.58

TABLE E-9

SUBPOPULATION MEANS OF
SELECTED VARIABLES
MECHANICAL RATINGS: ASHORE

	NON HS GRAD	AFQT: I & II	AFQT: IIIL & IV
SEX	0	0	.02
RACE	.09	.01	.21
MARITAL STAT	.44	.41	.40
H.S. GRAD	—	.84	.68
AGE: 21	.50	.22	.25
AGE: 24 +	.09	.16	.18
AFQT: I & II	.23	—	—
AFQT: IIIL & IV	.47	—	—
E-3	.29	.16	.29
E-5	.16	.42	.16

TABLE E-9 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
MECHANICAL RATINGS: ASHORE

	AGE: 21	AGE: 24+	E-3	E-5
SEX	.00	.16	.15	.05
RACE	.08	.15	.14	.04
MARITAL STAT.	.39	.48	.32	.49
H.S. GRAD	.52	.89	.73	.87
AGE: 21	—	—	.26	.19
AGE: 24+	—	—	.18	.19
AFQT: I & II	.29	.28	.16	.42
AFQT: IIIL & IV	.34	.33	.29	.16
E-3	.26	.25	—	—
E-5	.25	.30	—	—

TABLE E-10

SUBPOPULATION MEANS OF
SELECTED VARIABLES
MECHANICAL RATINGS: AFLOAT

	NON HS GRAD	AFQT: I & II	AFQT: IIIL & IV
SEX	0	0	0
RACE	.13	.02	.26
MARITAL STAT.	.41	.37	.38
H.S. GRAD	—	.88	.65
AGE: 21	.48	.22	.25
AGE: 24+	.10	.17	.16
AFQT: I & II	.17	—	—
AFQT: IIIL & IV	.52	—	—
E-3	.27	.11	.26
E-5	.22	.53	.18
ATLANTIC	.51	.54	.48

TABLE E-10 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
MECHANICAL RATINGS: AFLOAT

	AGE: 21	AGE: 24+	E-3	E-5
SEX	.00	.01	.00	.00
RACE	.10	.18	.18	.07
MARITAL STAT.	.36	.46	.27	.43
H.S. GRAD	.53	.85	.64	.85
AGE: 21	—	—	.25	.21
AGE: 24+	—	—	.15	.18
AFQT: I & II	.31	.37	.20	.51
AFQT: IIIL & IV	.37	.37	.52	.19
E-3	.19	.17	—	—
E-5	.31	.40	—	—
ATLANTIC	.50	.51	.46	.56

TABLE E-11

SUBPOPULATION MEANS OF
SELECTED VARIABLES
HIGH TECHNOLOGY RATINGS ASHORE

	NON HS GRAD	AFQT: I & II	AFQT: IIIL & IV
SEX	0	0	0
RACE	.15	.03	.31
MARITAL STAT.	.44	.38	.40
H.S. GRAD	—	.92	.76
AGE: 21	.52	.21	.26
AGE: 24+	.08	.20	.15
AFQT: I & II	.35	—	—
AFQT: III & IV	.37	—	—
E-3	.08	.03	.05
E-5	.39	.60	.35

TABLE E-11 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
HIGH TECHNOLOGY RATINGS: ASHORE

	AGE: 21	AGE: 24+	E-3	E-5
SEX	0	.01	0	.00
RACE	.12	.09	.09	.05
MARITAL STAT.	.28	.50	.38	.43
H.S. GRAD	.71	.95	.83	.78
AGE: 21	—	—	.16	.23
AGE: 24+	—	—	0	.22
AFQT: I & II	.52	.56	.44	.62
AFQT: IIIL & IV	.21	.15	.22	.12
E-3	.03	.00	—	—
E-5	.55	.61	—	—

TABLE E-12

SUBPOPULATION MEANS OF
SELECTED VARIABLES
HIGH TECHNOLOGY RATINGS: AFLOAT

	NON HS GRAD	AFQT I & II	AFQT: IIIL & IV
SEX	0	.00	.01
RACE	.12	.03	.28
MARITAL STAT	.41	.37	.41
H.S. GRAD	—	.93	.74
AGE: 21	.53	.20	.27
AGE: 24+	.07	.22	.16
AFQT: I & II	.36	—	—
AFQT: IIIL & IV	.36	—	—
E-3	.11	.04	.08
E-5	.32	.64	.30
ATLANTIC	.63	.58	.62

TABLE E-12 (Continued)

SUBPOPULATION MEANS OF
SELECTED VARIABLES
HIGH TECHNOLOGY RATINGS: AFLOAT

	AGE: 21	AGE: 24+	E-3	E-5
SEX	0	.05	.01	.02
RACE	.09	.10	.13	.05
MARITAL STAT.	.33	.46	.22	.42
H.S. GRAD	.71	.96	.75	.93
AGE: 21	—	—	.27	.20
AGE: 24+	—	—	.12	.24
AFQT: I & II	.57	.67	.43	.74
AFQT: IIIL & IV	.20	.12	.23	.09
E-3	.07	.03	—	—
E-5	.50	.61	—	—
ATLANTIC	.61	.60	.54	.63

TABLE E-13

CONDITIONAL PROBABILITY OF
REENLISTING OR EXTENDING

ASHORE

VARIABLE	ADMINISTRATIVE GROUP	MECHANICAL GROUP	HIGH TECHNOLOGY GROUP
SEX			
MALE	.3536	.2455	.2784
FEMALE	.4922	.5077	.5755
RACE			
WHITE	.4105	.2510	.3890
BLACK	.4719	.3724	.5728
AGE			
< 24	.3725	.2538	--
≥ 24	.4545	.3042	--
MARITAL STATUS			
SINGLE	.3777	.2340	.3674
MARRIED	.4253	.3026	.4578
EDUCATION			
NON HIGH SCHOOL	--	.3185	--
HIGH SCHOOL	--	.2462	--
GRADE			
≤ E3	.1832	.1816	.1821
E4	.3670	.2417	.3696
≥ E5	.4812	.3834	.4620
MENTAL GROUP			
I-II	.4089	.2781	.3978
III	.3642	.2373	.3537
III	.4347	.2622	--
IV	.5932	.3351	--
AWARD LEVEL			
0	.3900	--	.3354
1	.4203	--	.3674
2	.4511	--	.4004
3	.4822	--	.4341
4	.5135	--	.4783
5	.5446	--	.5028
6	.5755	--	.5372

TABLE E-14

CONDITIONAL PROBABILITY OF
REENLISTING OR EXTENDING

AFLOAT

VARIABLE	ADMINISTRATIVE GROUP	MECHANICAL GROUP	HIGH TECHNOLOGY GROUP
RACE			
WHITE	.4547	.4804	.6449
BLACK	.5578	.5646	.7739
AGE			
< 24	.4571	.4801	--
≥ 24	.5324	.4992	--
MARITAL STATUS			
SINGLE	.4386	.4551	.6067
MARRIED	.5392	.5485	.7339
EDUCATION			
NON HIGH SCHOOL	.5444	.5158	--
HIGH SCHOOL	.4613	.4740	--
GRADE			
≤ E3	.3473	.4098	.4485
E4	.4718	.4603	.5719
≥ E5	.5211	.5760	.7356
MENTAL GROUP			
I-II	.5159	.5508	.7033
IIIυ	.4607	.4465	.5714
IIIL	--	--	--
IV	--	--	--
AWARD			
0	.4251	.5145	.5145
1	.5083	.5652	.5652
2	.5912	.6148	.6148
3	.6701	.6627	.6627
4	.7422	.7080	.7080
5	.8051	.7502	.7502
6	.8437	.7890	.7890

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